

**Description of the  
2000 Oceanographic Conditions  
on the Northeast Continental Shelf**

**by**

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National Oceanic and Atmospheric Administration  
National Marine Fisheries Service  
Northeast Region  
Northeast Fisheries Science Center  
Woods Hole, Massachusetts**

**February 2001**

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**This report's** publication history is as follows: manuscript submitted for review -- February 6, 2001; manuscript accepted through technical review -- February 8, 2001; manuscript accepted through policy review -- February 12, 2001; and camera-ready copy submitted for publication -- February 14, 2001. This report may be cited as:

Taylor, M.H.; Bascuñán, C. 2001. Description of the 2000 oceanographic conditions on the Northeast Continental Shelf. *Northeast Fish. Sci. Cent. Ref. Doc.* 01-01; 93 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026.

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## Abstract

A summary of hydrographic observations for 11 surveys on the northeast continental shelf during 2000 is presented. Distributions of station position, surface and bottom temperature, salinity, and anomalies are portrayed. The average surface and bottom temperatures and salinities have been calculated in five geographic regions over the northeast continental shelf: western Gulf of Maine (GOMW), eastern Gulf of Maine (GOME), Georges Bank (GB), northern Middle Atlantic Bight (MABN) and southern Middle Atlantic Bight (MABS). Time series plots from various shipboard environmental sensors are included for each survey.

Temperature conditions during the spring and early summer were warmer than the expected temperatures derived from the MARMAP reference period (1977-1987). Data from the fall bottom trawl survey indicated that the warmer temperatures did not persist into September and October. Instead the shelf temperatures had cooled to near, or slightly below, expected values. Salinity data collected in the Gulf of Maine during the November Ecosystem Monitoring survey suggest that there was an increased inflow of Scotian shelf water during the previous month that resulted in fresher conditions than what was observed during the fall bottom trawl survey.

## Introduction

The Northeast Fisheries Science Center (NEFSC) conducts several different surveys off the northeast continental shelf each year. Complete coverage of the shelf (Cape Hatteras to the Gulf of Maine) occurs during the spring and fall bottom trawl surveys and during some of the Ecosystem Monitoring cruises. Station coverage on other cruises throughout the year varies.

Temperature and salinity observations from 11 NEFSC surveys conducted during 2000 are summarized and presented in this report. Cruise operation summaries are presented for all cruises. Distribution plots of surface and bottom temperature, salinity, and anomalies are contoured where sufficient data are available. Areal average temperature and salinity and the corresponding anomalies also are presented for the five different regions on the shelf. The data are presented chronologically in atlas form. Environmental data from the SCS system (Shipboard Computing System) are presented as time series figures for each leg of a cruise. No attempt has been made here to analyze the data or discuss in detail individual observations from the cruises.

### **Data and Methods:**

Temperature and salinity measurements were obtained with a Seabird (SBE) model 19 profiling CTD (Profiler), which measures the pressure, temperature and conductivity of the water twice per second. Two different methods of deployment were used depending upon the type of work conducted at a station (See Taylor and Bascuñán, 2000). Whenever a plankton haul was done, the Profiler was placed above the bongo nets (sensors facing up), and a double oblique tow was made. Upcast data are used as the primary data when the Profiler is deployed with bongo nets. The turbulence generated by the bongo nets during the downcast adversely affects the temperature and conductivity data quality. If no plankton haul was done, the Profiler was deployed vertically (sensors facing down) through the water column and the downcasts are processed as the primary data. Salinity samples are taken from the bottom of a vertical profile cast, generally twice per day, in order to calibrate the conductivity data. These samples are analyzed on shore with a Guildline Autosal Salinometer.

All raw Profiler data were processed using the Seabird manufactured software: DATCNV, FILTER, ALIGNCTD, BINAVG, DERIVE, and ASCIIOUT to produce 1 decibar averaged ascii files. The data were edited, cleaned, and converted to a standard 80-column ASCII formatted cruise file and were archived in the NEFSC anonymous FTP account (whsun2:/ftp/pub/hydro).

Station distributions and horizontal contour plots of the surface and bottom temperature, salinity, and temperature anomaly were prepared for each survey if coverage was sufficient. Areal average temperatures and salinities were calculated for the five regions of the northeast continental shelf shown in Figure 1: western and eastern Gulf of Maine, Georges Bank, and the northern and southern Middle Atlantic Bight. The areal averaging was done using the method described in Holzwarth and Mountain (1990). The areal averages and anomalies were plotted against the mid-date (calendar day) of all observations within a region for each cruise.

## Results

The NEFSC cruises for which data are presented in this report are listed in Table 1. A summary of each cruise is listed in Appendix A and includes information on the type of cruise, its objectives, dates, the number of hydrographic stations, type(s) of instruments used, salinity calibration value, and notes pertaining to instrument performance. No salinity correction was applied to the cruise data if the mean salinity offset was less than +/- 0.01 psu.

Table 2 lists the surface and bottom areal average temperatures and temperature anomalies that were calculated for each of the five regions. Table 3 lists the surface and bottom areal average salinity and salinity anomalies for the same five regions. Cruise data were combined for the fall bottom trawl survey (ALB0006) and the acoustic survey (DEL0008). This

was done because the cruises were conducted at the same time and in the same region(s) and because the acoustic survey by itself did not have sufficient coverage to generate true areal averages. For most cruises, the areal averages and anomalies could not be calculated for all regions due to limited station coverage. In many cases a simple average (not an areal weighted mean) was determined for the observations in the region; these values are indicated in tables 2 and 3 by an asterisk. The standard deviations are also listed. SDV1 indicates how well the calculated anomaly represents the true regional average anomaly. SDV2 is an indicator of how closely the areal average matches the anomaly at any particular location within that region (see Holzwarth and Mountain, 1990 for explanation of SDV1 and SDV2).

Figures 2 - 3 present the time series of surface and bottom average temperature/salinity and temperature/salinity anomaly for each region. Cruises having less than 10 observations were not included in the time series figures. We were not able to resolve small-scale, localized events because of the regional averaging method used in this report. Station positions and distributions of surface and bottom temperature, salinity, and anomalies for the different cruises are presented in figures 4 - 54. Contour distribution figures were not prepared for some of the cruises because of poor station coverage. Environmental time series plots (SCS data) are included in Appendix B. Further information about this data may be obtained at  
<http://www.wh.whoi.edu/~jmanning/foi/alongtrack.html>.

## Discussion

Surface and bottom temperature anomalies in the Mid-Atlantic Bight and Georges Bank regions showed a pattern of gradual cooling during the year. All regions experienced warmer conditions during the winter and early spring. By November, temperatures on the shelf had

decreased to near expected or slightly colder than expected values relative to the MARMAP reference. A number of Gulf Stream warm-core rings were observed in satellite imagery during the spring and summer that may have contributed to the warmer conditions observed during the spring and early summer in the Georges Bank and MAB regions. With the exception of the southern Mid-Atlantic region, the salinities observed on the Shelf during much of the year were near the expected values. The salinity anomalies of the southern Mid-Atlantic Bight region exhibited a pattern similar to the temperature anomalies with saltier conditions occurring during the first part of the year that gradually declined to near normal or slightly below the expected values.

The salinity distribution in the Gulf of Maine during the fall Ecosystem Monitoring survey (ALB0007) is in sharp contrast to what was observed in the same region during the fall bottom trawl survey (ALB0006). The areal average surface (bottom) salinity for the eastern Gulf of Maine decreased by more than 1.0 (0.25) psu from mid-October to mid-November. This suggests that there may have been an increased contribution of Scotian Shelf water into the Gulf of Maine region.

The Northeast Regional Climate Center (NRCC, Cornell University) compiles seasonal summaries of mean air temperature and precipitation using over 100 years of compiled historical data. Consistent with the temperature conditions observed on NEFSC cruises, the NRCC reports that air temperatures for both the winter and spring of 2000 were warmer than the mean, while the summer and fall were much cooler than most years comprised in the historical mean. Further information about the NRCC and its data products may be obtained at [http://met-www.cit.cornell.edu/nrcc\\_home.html](http://met-www.cit.cornell.edu/nrcc_home.html).

## References

Holzwarth, T.J. and D. Mountain. 1990. Surface and bottom temperature distributions from the Northeast Fisheries Center spring and fall bottom trawl survey program, 1963-1987. Woods Hole, MA: Northeast Fisheries Center. Reference Document 90-03. Available from: Information Services Section, NMFS/Northeast Fisheries Science Center, Woods Hole, MA; 02543

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Taylor, M. H. and Bascuñán, C. 2000. CTD Data Collection on Northeast Fisheries Science Center Cruises: Standard Operating Procedures. *Northeast Fisheries Science Center Reference Doc.* 00-11; 28 p. Available from: National Marine Fisheries Service, 166 Water St., Woods Hole, MA 02543.

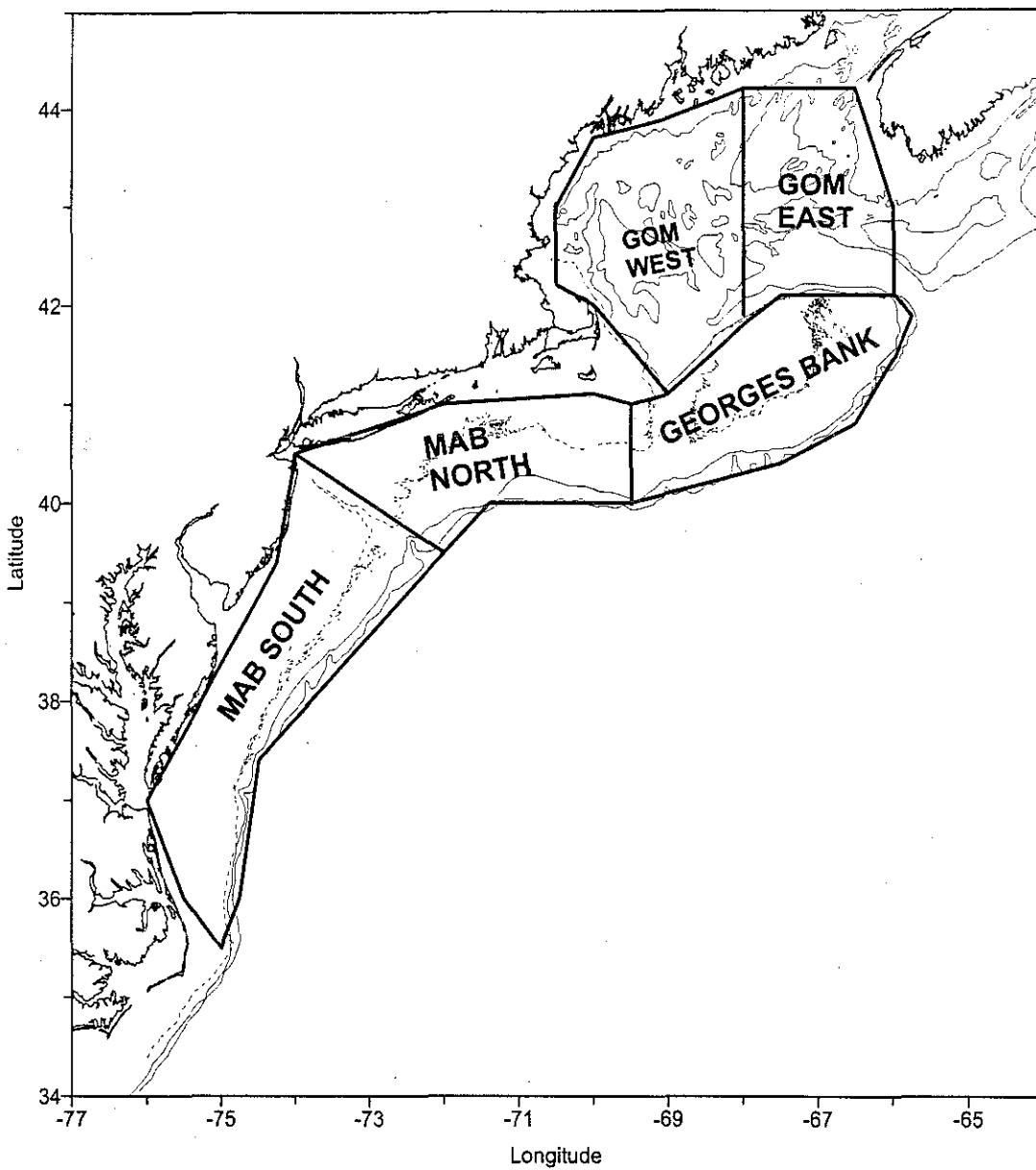


Figure 1. The regions of the northeast continental shelf covered by the Northeast Fisheries Science Center cruises during 2000.

Table 1. Summary of 2000 Cruises.

Cruise	Program	Dates	Regions <sup>1</sup>
ALB0001	Winter Bottom Trawl	10 – 29 February	MAB, GB
ALB0002	Spring Bottom Trawl	16 March – 8 May	MAB, GB, GOM
DEL0006	Ecosystem Monitoring	23 May - 8 June	MAB, GB, GOM
ALB0003	Benthic Habitat Study	20 - 28 June	GB
ALB0004	Scallop Survey	7 July - 17 August	MAB, GB
ALB0005	Ecosystem Monitoring	23 - 29 August	GB, GOM
DEL0007	Right Whale Survey	9 July - 28 August	GOM (East)
ALB0006	Fall Bottom Trawl	6 Sept – 20 October	GOM, GB, MAB
DEL0008	Hydro-Acoustic Survey	13 Sept– 7 October	GB, GOM
ALB0007	Ecosystem Monitoring	31 Oct – 15 Nov	GOM, GB
DEL0010	Benthic Habitat Study	3 – 13 November	GB

<sup>1</sup> Regional Abbreviations:

GOM = Gulf of Maine

MAB = Mid-Atlantic Bight

GB = Georges Bank

Table 2. Areal average surface and bottom temperature and temperature anomalies for the 2000 NEFSC cruises in the five regions of the northeast continental shelf as shown in Figure 1

CRUISE	CD	SURFACE					BOTTOM					
		#obs	Temp	Anomaly	SDV1	SDV2	#obs	Temp	Anomaly	SDV1	SDV2	
(**)												
<b>Gulf of Maine West</b>												
AL0002	118	44	6.48	1.01	0.20	0.68	43	6.18	1.16	0.15	0.79	
DE0006	159	11	10.72	0.33	0.35	1.09	10	6.27	0.95	0.29	.25*	
AL0005	241	14	18.71	1.99	0.37	0.99	12	7.05	0.75	0.26	0.87	
ALB/DEL	289	79	13.46	0.75	0.17	0.95	78	7.97	0.72	0.14	1.12	
AL0007	318	12	10.88	0.62	0.33	0.81*	10	8.96	0.62	0.30	1.30*	
<b>Gulf of Maine East</b>												
AL0002	111	34	5.96	0.94	0.22	0.89	26	7.46	1.19	0.25	0.83	
DE0006	156	11	9.79	1.27	0.33	0.90	9	7.89	0.85	0.42	0.59	
AL0005	240	14	16.93	2.57	0.33	1.15	11	9.19	0.54	0.41	1.94	
ALB/DEL	282	61	13.55	0.44	0.19	0.94	47	9.19	0.40	0.20	1.52	
AL0007	316	14	10.86	0.37	0.25	0.58	10	9.27	0.51	0.32	1.37	
<b>Georges Bank</b>												
AL0001	60	10	7.92	1.91	0.50	2.51*	6	9.09	2.03	0.64	3.86*	
AL0002	101	56	7.03	1.89	0.19	0.71	47	7.14	1.81	0.21	0.78	
DE0006	153	29	10.45	0.92	0.28	0.92	24	9.36	1.44	0.33	0.99	
AL0003	175	36	12.54	1.49	0.19	1.09*	36	9.15	1.04	0.19	1.00*	
AL0004	220	36	16.54	0.89	0.22	2.40	35	11.38	0.51	0.25	1.79	
AL0005	237	31	17.75	1.62	0.23	1.64	27	12.28	0.12	0.26	1.91	
ALB/DEL	274	81	16.08	0.50	0.18	1.00	74	12.53	0.03	0.24	1.73	
AL0007	312	32	12.71	-0.01	0.25	1.70	23	11.23	-0.79	0.27	1.01	
<b>MAB North</b>												
AL0001	57	41	6.61	1.68	0.26	1.39*	32	6.39	0.79	0.30	1.36*	
AL0002	92	62	6.82	2.15	0.25	0.86	55	7.38	1.92	0.29	1.19	
DE0006	149	23	12.43	0.54	0.36	1.04	20	8.81	1.38	0.43	1.57	
AL0004	209	17	20.17	0.23	0.35	1.25*	17	10.34	1.73	0.36	1.04*	
ALB/DEL	266	60	19.46	1.05	0.27	1.13	53	13.31	0.91	0.31	1.57	
AL0007	310	21	13.21	-0.98	0.35	0.75	19	12.52	-0.64	0.44	0.87	

**MAB South**

AL0001	48	62	8.18	1.62	0.25	1.73	51	8.02	1.42	0.30	1.63
AL0002	81	83	8.10	2.04	0.23	1.09	75	7.75	1.90	0.29	1.26
DE0006	146	33	15.03	0.10	0.32	1.08	29	10.08	1.15	0.36	1.71
AL0004	199	43	22.19	-0.88	0.26	1.40*	43	9.20	1.68	0.30	1.40*
ALB/DEL	257	87	22.46	0.30	0.23	1.55	80	15.93	1.74	0.27	1.92
AL0007	305	33	15.34	-0.60	0.34	0.62	33	15.31	0.32	0.35	1.08*

(1) "CRUISE", the code name for a cruise: "CD", the calendar mid-data of all the stations within a region for a cruise:  
 "# obs", the number of observations included in each average: "Temp", the areal average temperature: "Anomaly",  
 the areal average temperature anomaly: "SDV1", the standard deviation associated with the average temperature  
 anomaly: "SDV2", the standard deviation of the individual anomalies from which the average anomaly was derived.

(\*) A true areal average could not be calculated due to poor station coverage. The average values listed were derived  
 from a simple average of the observations within the region.

(\*\*) ALB/DEL = AL0006 + DE0008

Table 3. Areal average surface and bottom Salinity and Salinity anomalies for the 2000 NEFSC cruises in the five regions of the northeast continental shelf as shown in Figure 1

CRUISE	CD	SURFACE					BOTTOM					
		#obs	Salt	Anomaly	SDV1	SDV2	#obs	Salt	Anomaly	SDV1	SDV2	
(**)												
<b>Gulf of Maine West</b>												
AL0002	118	44	32.50	0.08	0.08	0.70	44	33.34	-0.02	0.05	0.27	
DE0006	159	11	32.26	0.05	0.15	0.45	10	33.08	-0.18	0.09	0.16*	
AL0005	241	14	32.22	0.09	0.15	0.25	12	33.55	-0.09	0.11	0.28	
ALB/DEL	289	75	32.59	0.14	0.07	0.23	77	33.61	0.03	0.06	0.22	
AL0007	318	12	32.50	-0.25	0.14	0.62*	10	33.53	0.17	0.10	0.28*	
<b>Gulf of Maine East</b>												
AL0002	111	34	32.48	0.01	0.12	0.23	29	33.89	0.04	0.09	0.42	
DE0006	156	10	32.57	0.06	0.16	0.12*	10	33.72	-0.07	0.13	0.31	
AL0005	240	14	32.49	0.07	0.17	0.18	11	34.11	0.15	0.17	0.22	
ALB/DEL	282	60	32.66	0.13	0.11	0.23	56	34.29	0.16	0.09	0.27	
AL0007	316	13	31.66	-1.01	0.14	0.75	11	33.86	-0.22	0.11	0.44	
<b>Georges Bank</b>												
AL0001	60	10	33.45	0.39	0.21	1.22*	6	34.26	0.81	0.22	1.49*	
AL0002	101	55	33.10	0.19	0.07	0.15	49	33.34	0.17	0.07	0.32	
DE0006	153	26	32.97	0.12	0.10	0.43	24	33.27	0.16	0.11	0.39	
AL0003	175	35	32.61	-0.03	0.07	0.24*	36	32.88	0.03	0.06	0.32*	
AL0004	220	35	32.66	-0.02	0.09	0.49	35	33.04	0.07	0.09	0.38	
AL0005	237	31	32.75	0.05	0.09	0.60	27	33.08	0.17	0.10	0.37	
ALB/DEL	274	79	32.38	-0.37	0.07	0.38	74	32.89	-0.16	0.08	0.34	
AL0007	312	32	32.83	0.02	0.09	0.67	24	32.96	-0.06	0.09	0.58	
<b>MAB North</b>												
AL0001	57	41	33.48	0.38	0.12	0.44*	32	33.72	0.19	0.10	0.45*	
AL0002	92	62	32.93	0.11	0.12	0.43	55	33.57	0.18	0.10	0.39	
DE0006	149	23	32.50	0.06	0.18	0.55	20	33.25	0.05	0.15	0.66	
AL0004	209	17	32.01	0.15	0.17	0.50*	17	32.88	-0.03	0.13	0.27*	
ALB/DEL	266	60	32.63	-0.10	0.13	0.88	53	33.59	-0.02	0.10	0.37	
AL0007	310	21	32.62	-0.38	0.17	0.51	19	32.76	-0.88	0.15	0.74	

**MAB South**

AL0001	48	62	34.45	0.69	0.14	0.46	51	34.50	0.70	0.11	0.37
AL0002	81	83	33.50	0.51	0.13	0.94	75	33.70	0.29	0.11	0.80
DE0006	146	32	32.44	0.31	0.20	0.77	29	33.42	0.22	0.14	0.56
AL0004	199	43	32.20	0.29	0.13	0.84*	43	33.35	0.11	0.10	0.55*
ALB/DEL	257	86	32.52	0.36	0.14	1.42	80	32.70	-0.50	0.10	0.82
AL0007	305	33	33.13	0.17	0.19	0.48	33	33.09	-0.27	0.12	0.56*

(1) "CRUISE", the code name for a cruise; "CD", the calendar mid-date of all the stations within a region for a cruise; "# obs", the number of observations included in each average; "Salt", the areal average Salinity; "Anomaly", the areal average Salinity anomaly; "SDV1", the standard deviation associated with the average Salinity anomaly; "SDV2", the standard deviation of the individual anomalies from which the average anomaly was derived.

(\*) A true areal average could not be calculated due to poor station coverage. The average values listed were derived from a simple average of the observations within the region.

(\*\*) ALB/DEL = AL0006 + DE0008

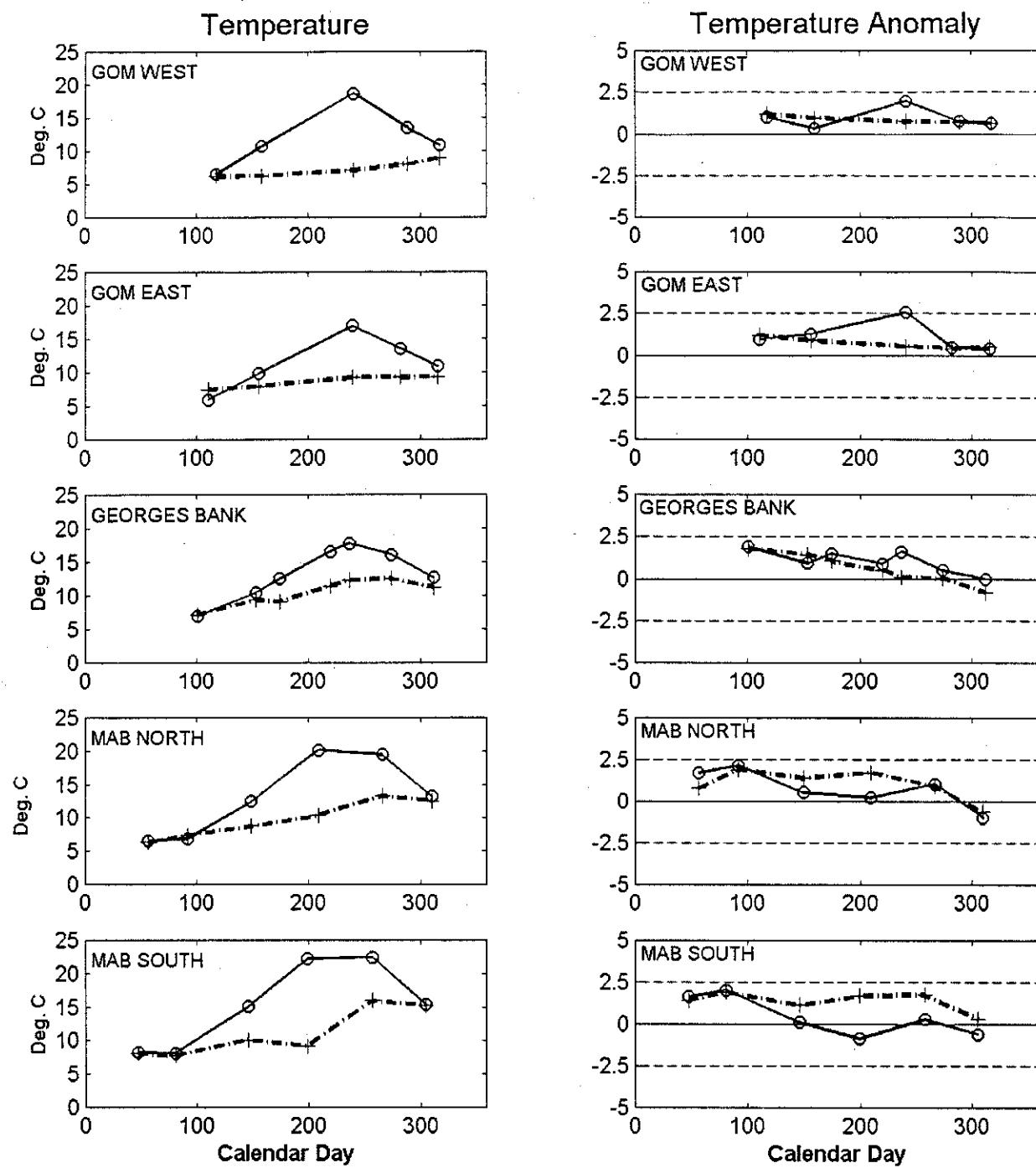


Figure 2. The 2000 areal average surface (-o) and bottom (-+) temperature (left) and anomalies (right) from Table 2.

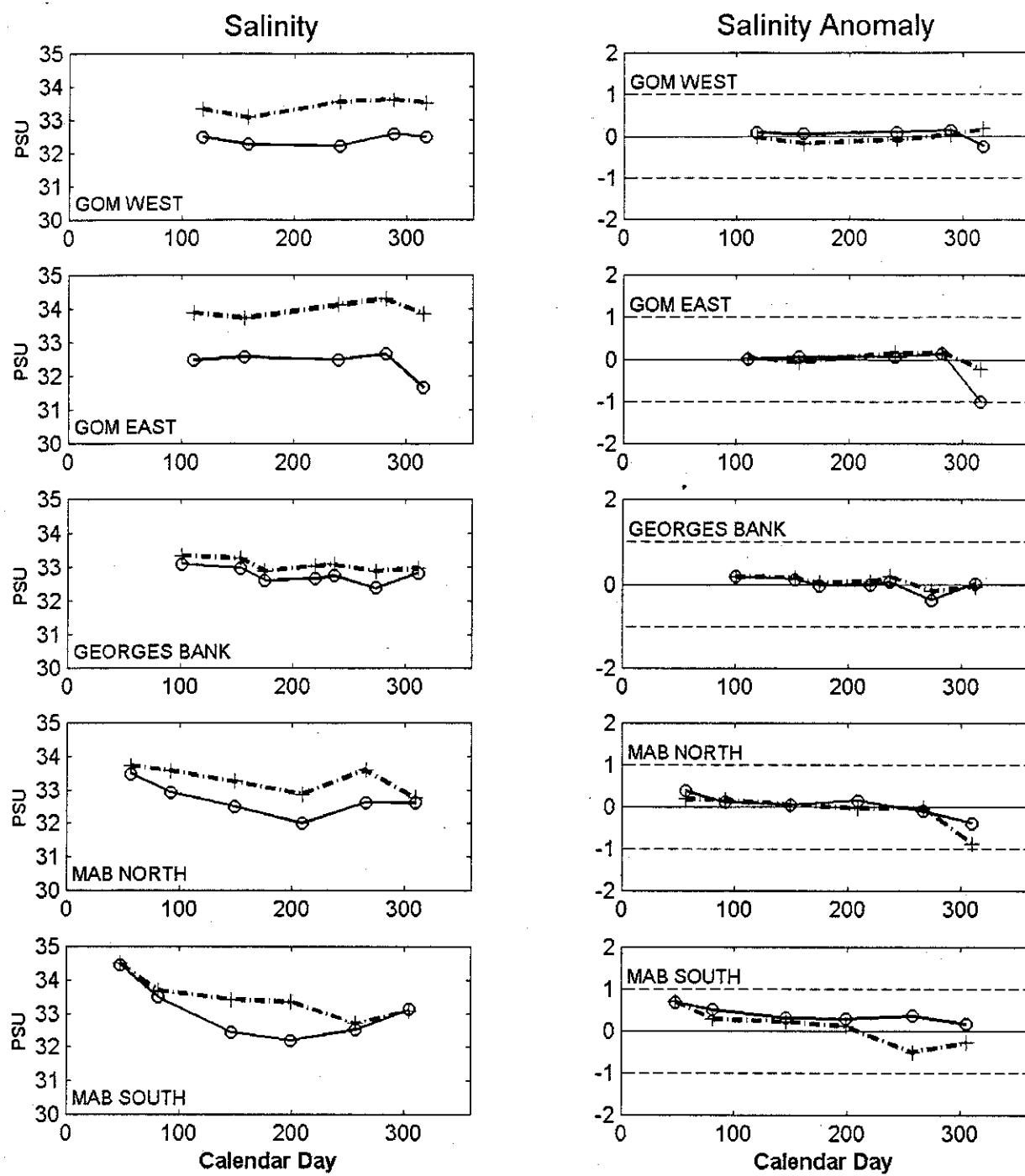
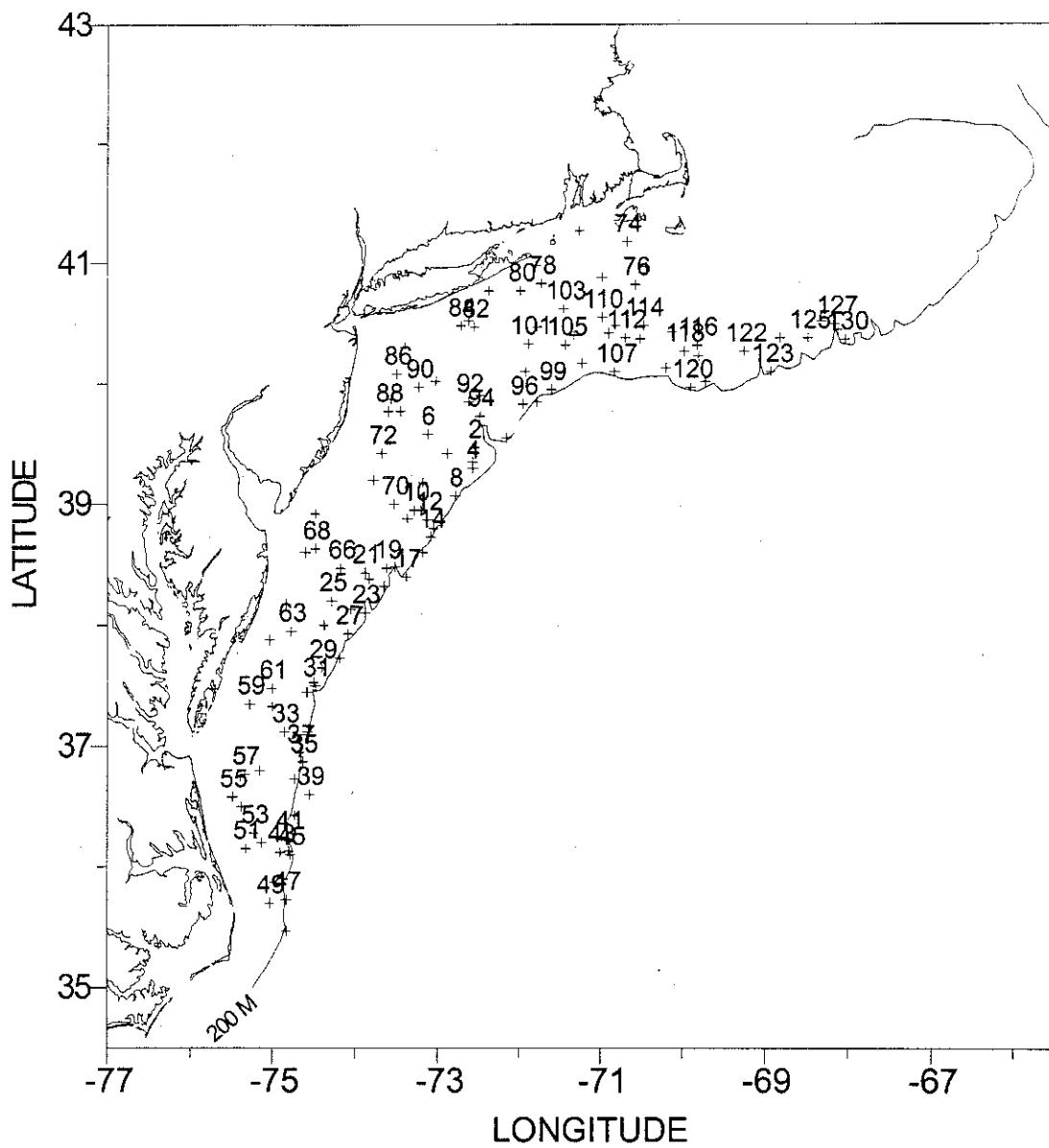


Figure 3. The 2000 areal average surface (-o) and bottom (-+-) salinity (left) and anomalies (right) from Table 3.



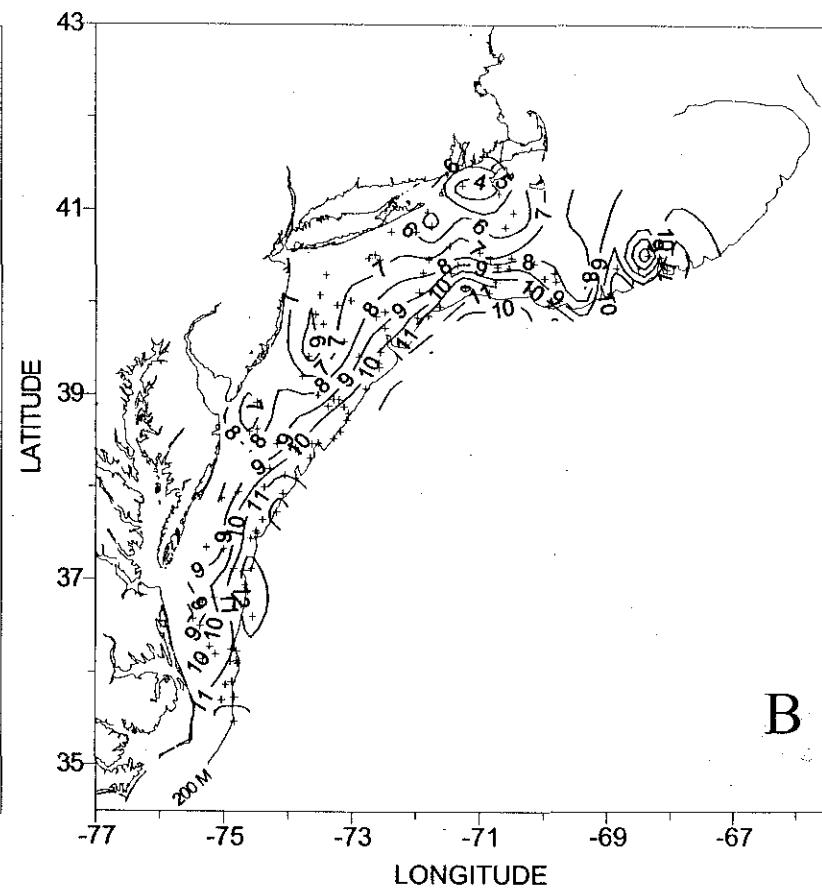
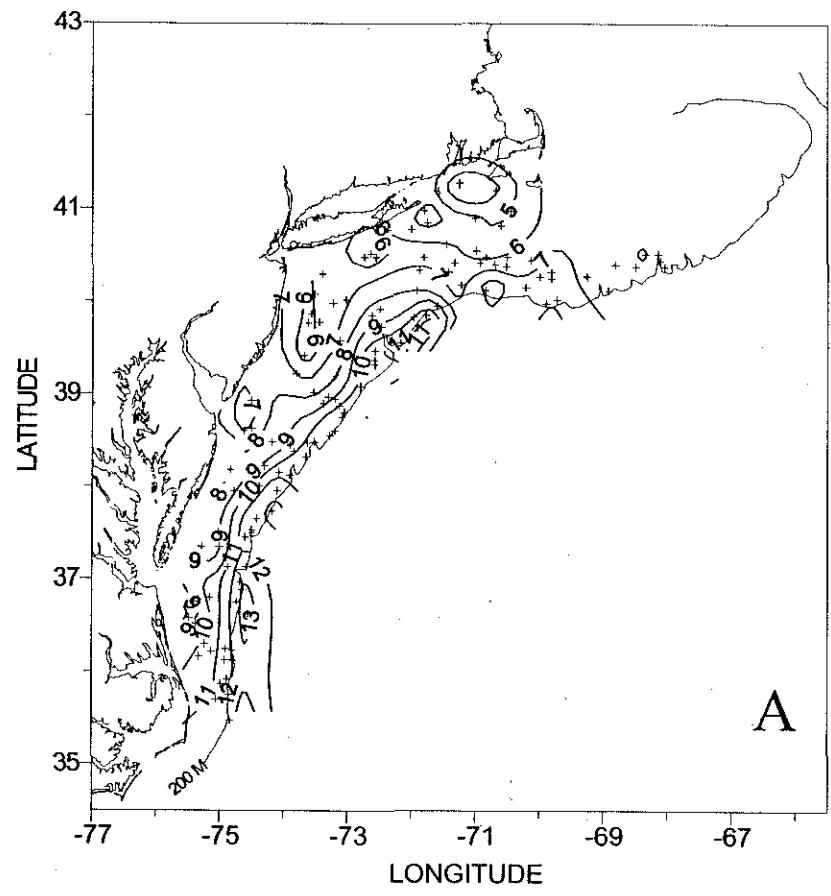


Figure 5. Surface (A) and bottom (B) temperature distributions for the Winter Bottom Trawl - ALB0001.

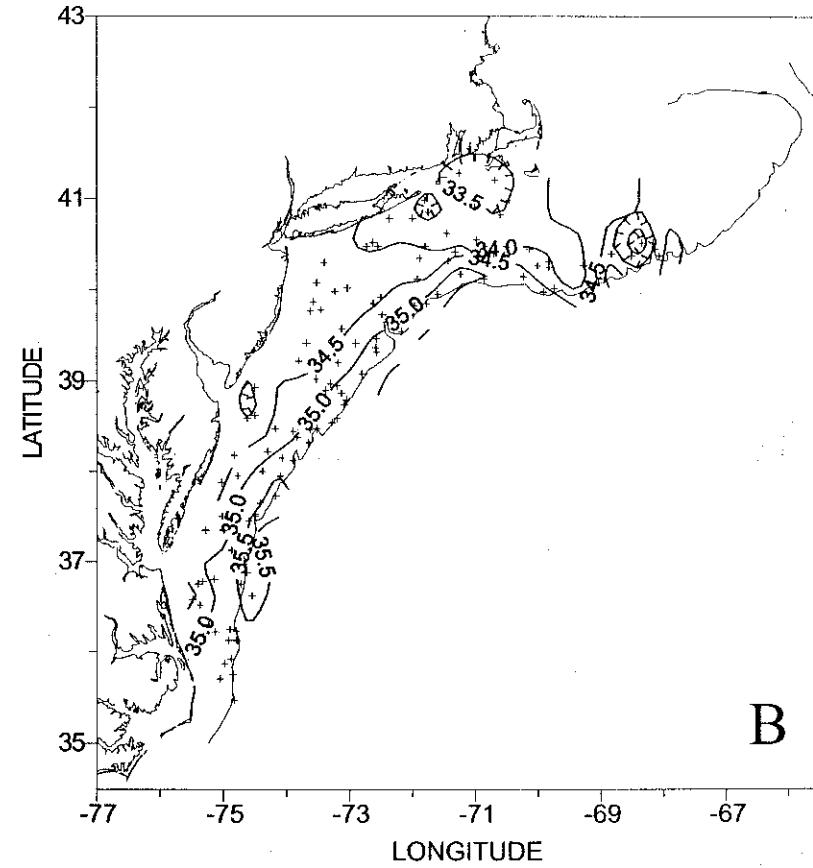
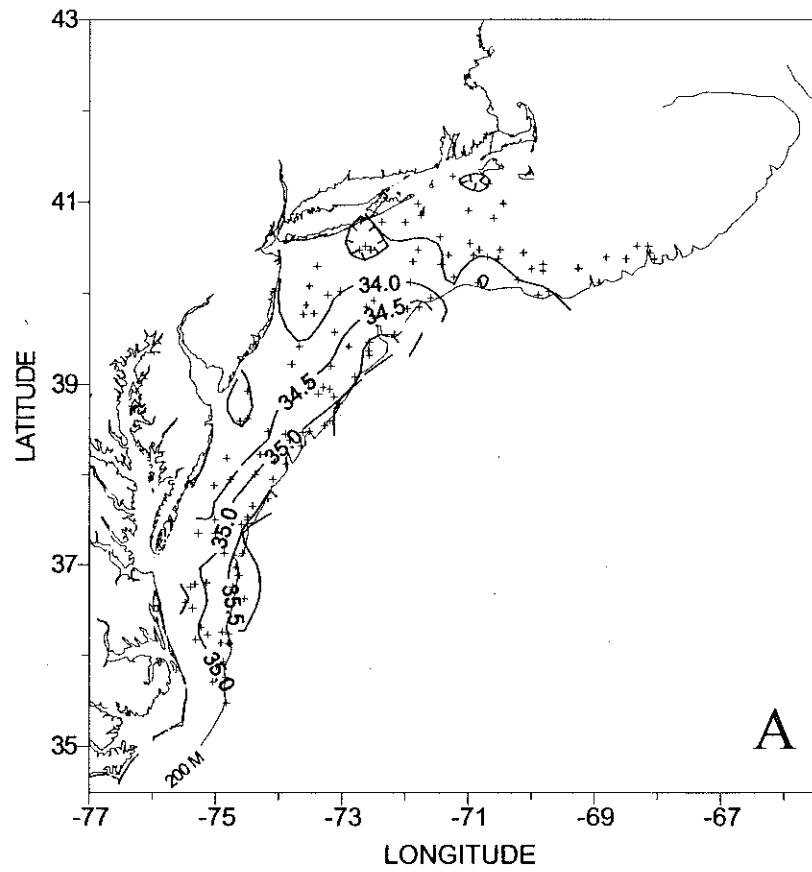


Figure 6. Surface (A) and bottom (B) salinity distributions for the Winter Bottom Trawl - ALB0001.

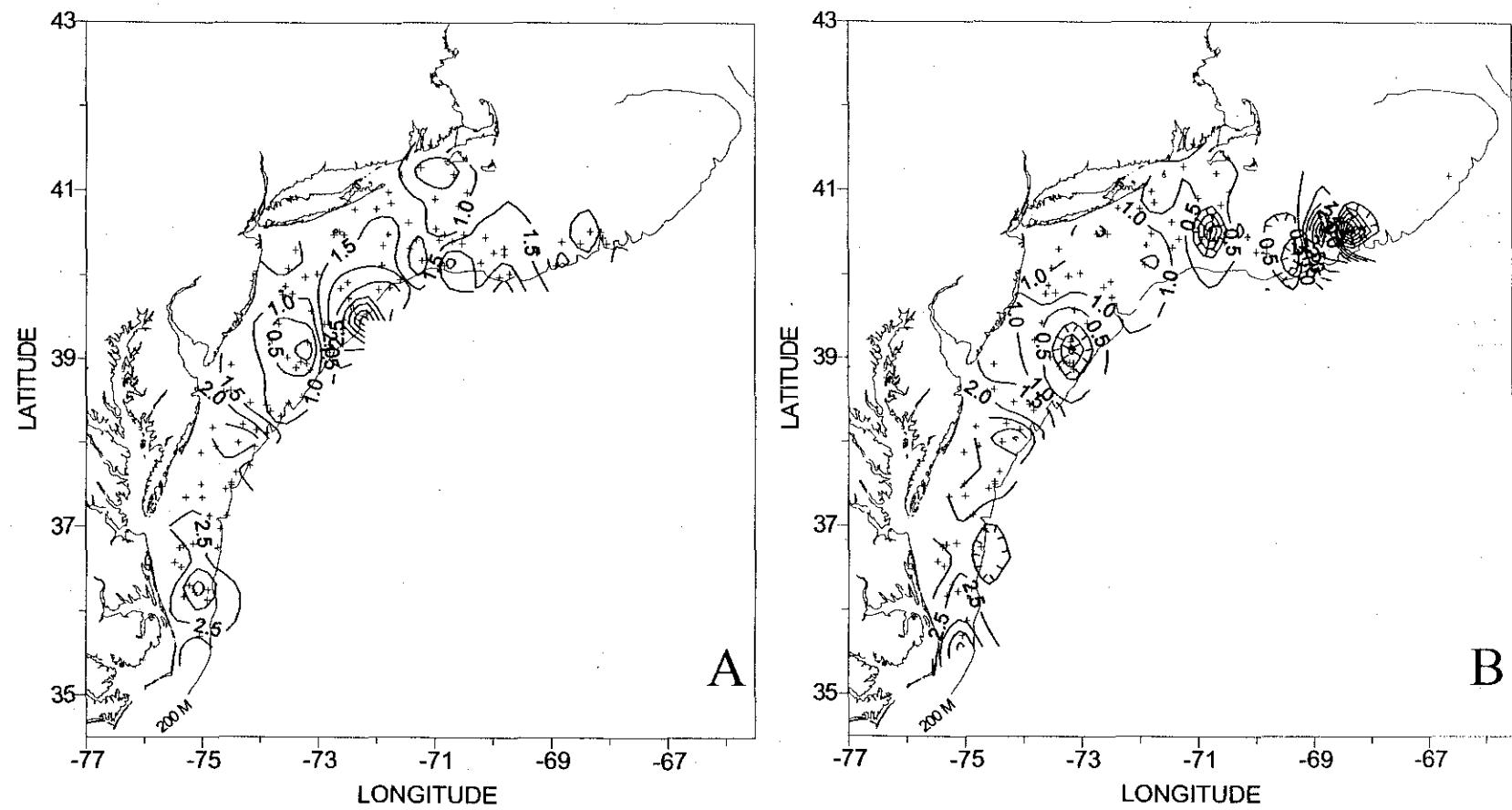


Figure 7. Surface (A) and bottom (B) temperature anomaly distributions for the Winter Bottom Trawl - ALB0001.

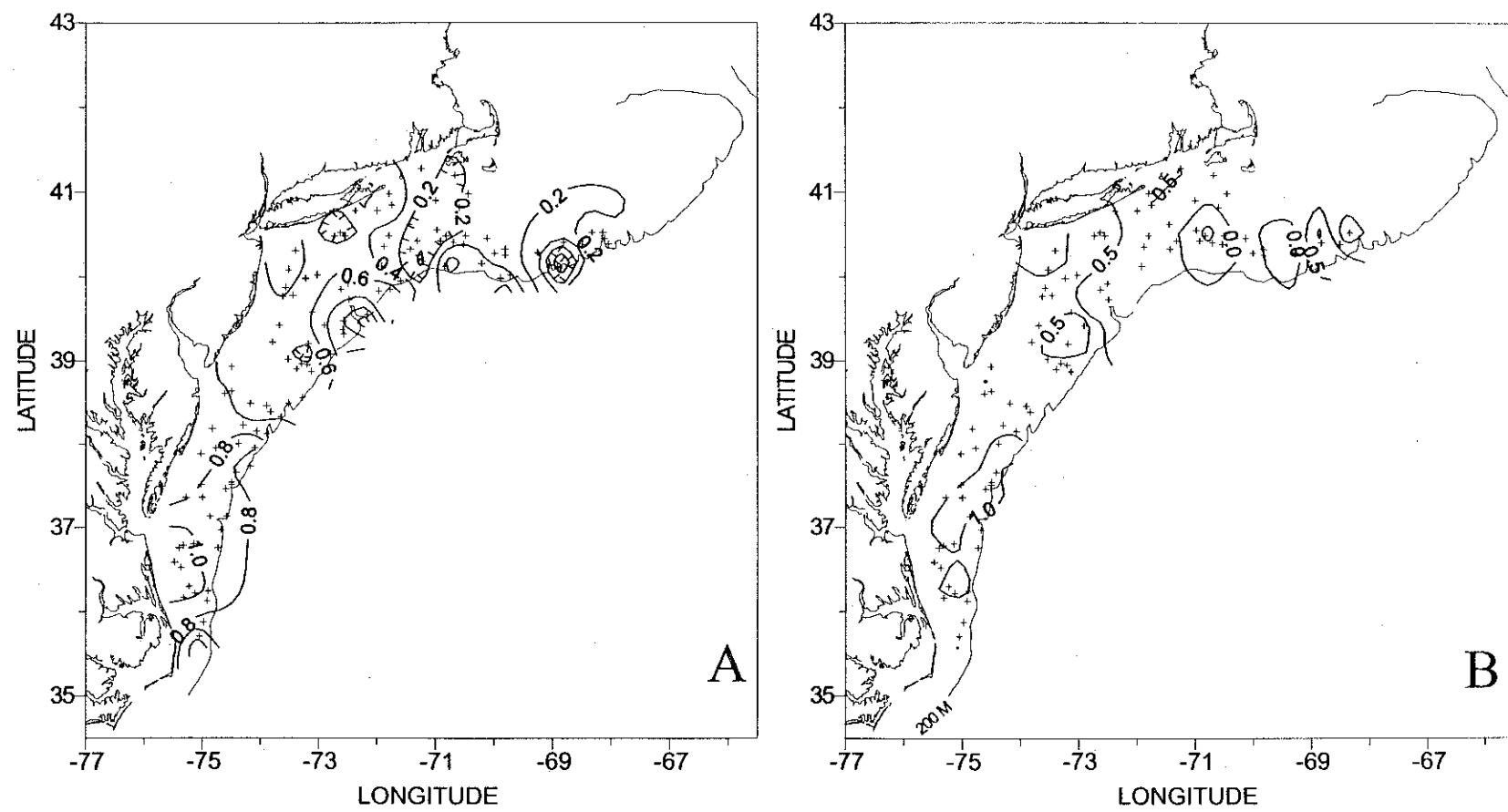


Figure 8. Surface (A) and bottom (B) salinity anomaly distributions for the Winter Bottom Trawl - ALB0001.

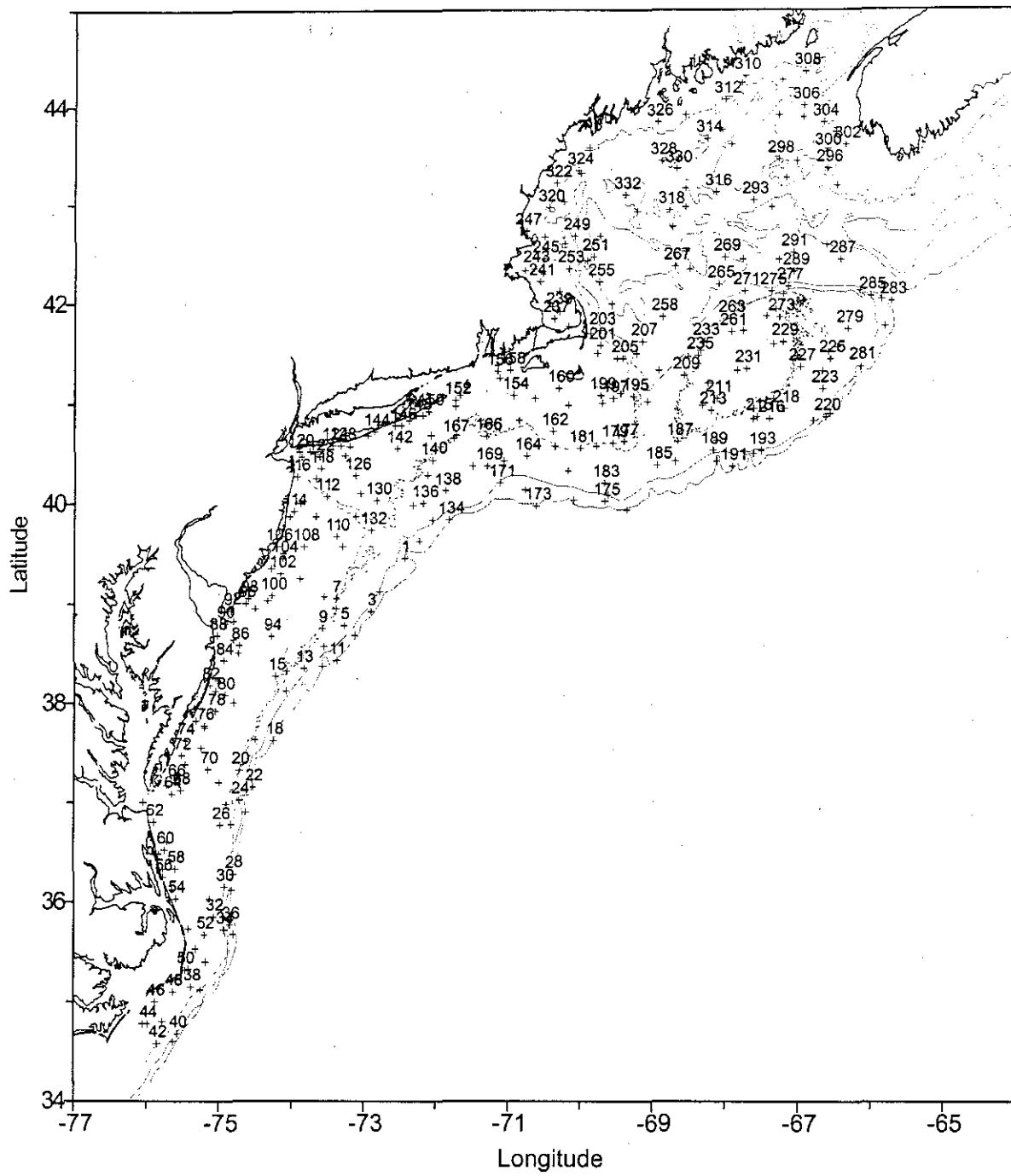


Figure 9. Hydrographic stations occupied during the Spring Bottom Trawl - ALB0002.

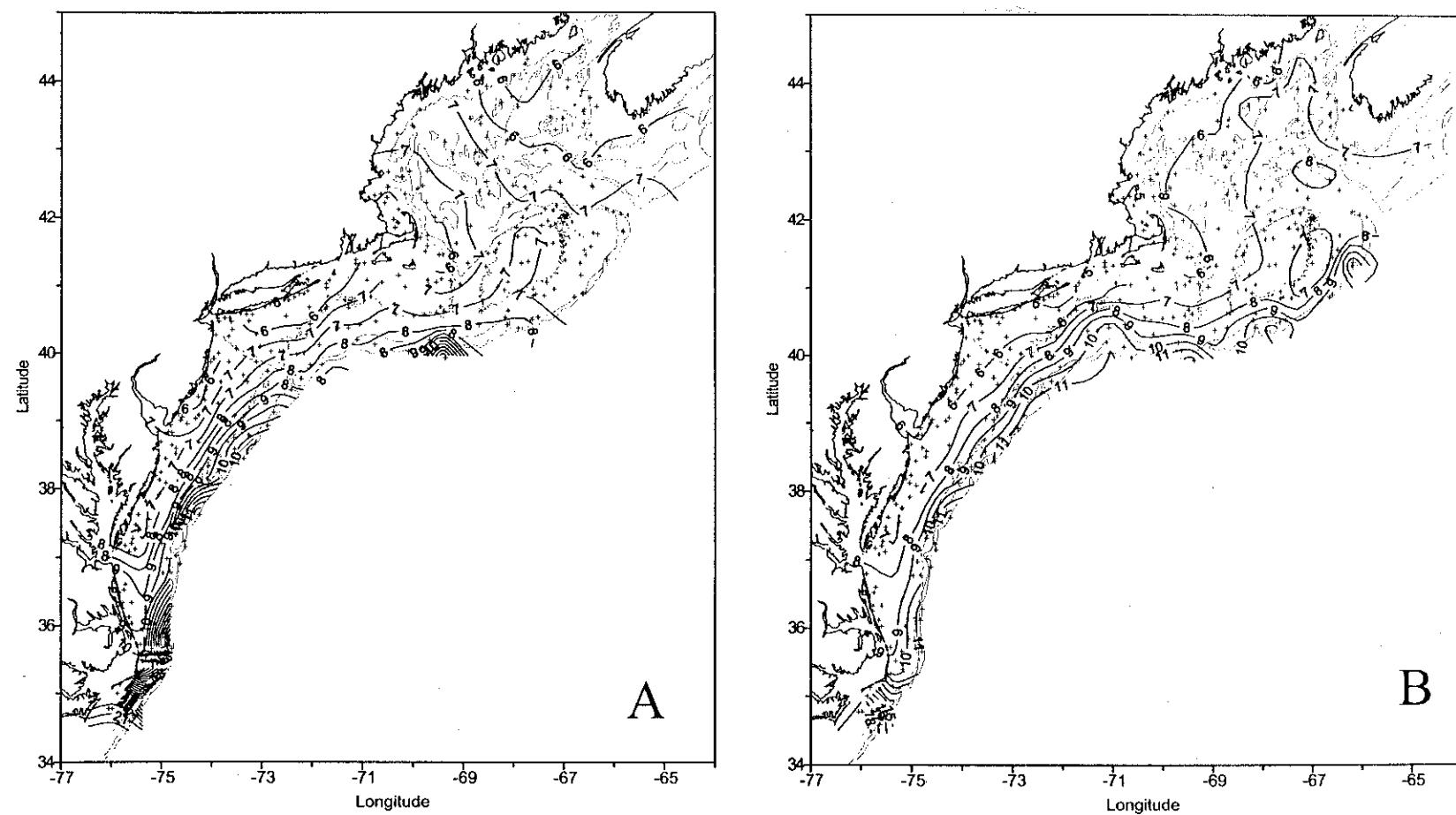


Figure 10. Surface (A) and bottom (B) temperature distributions for the Spring Bottom Trawl - ALB0002.

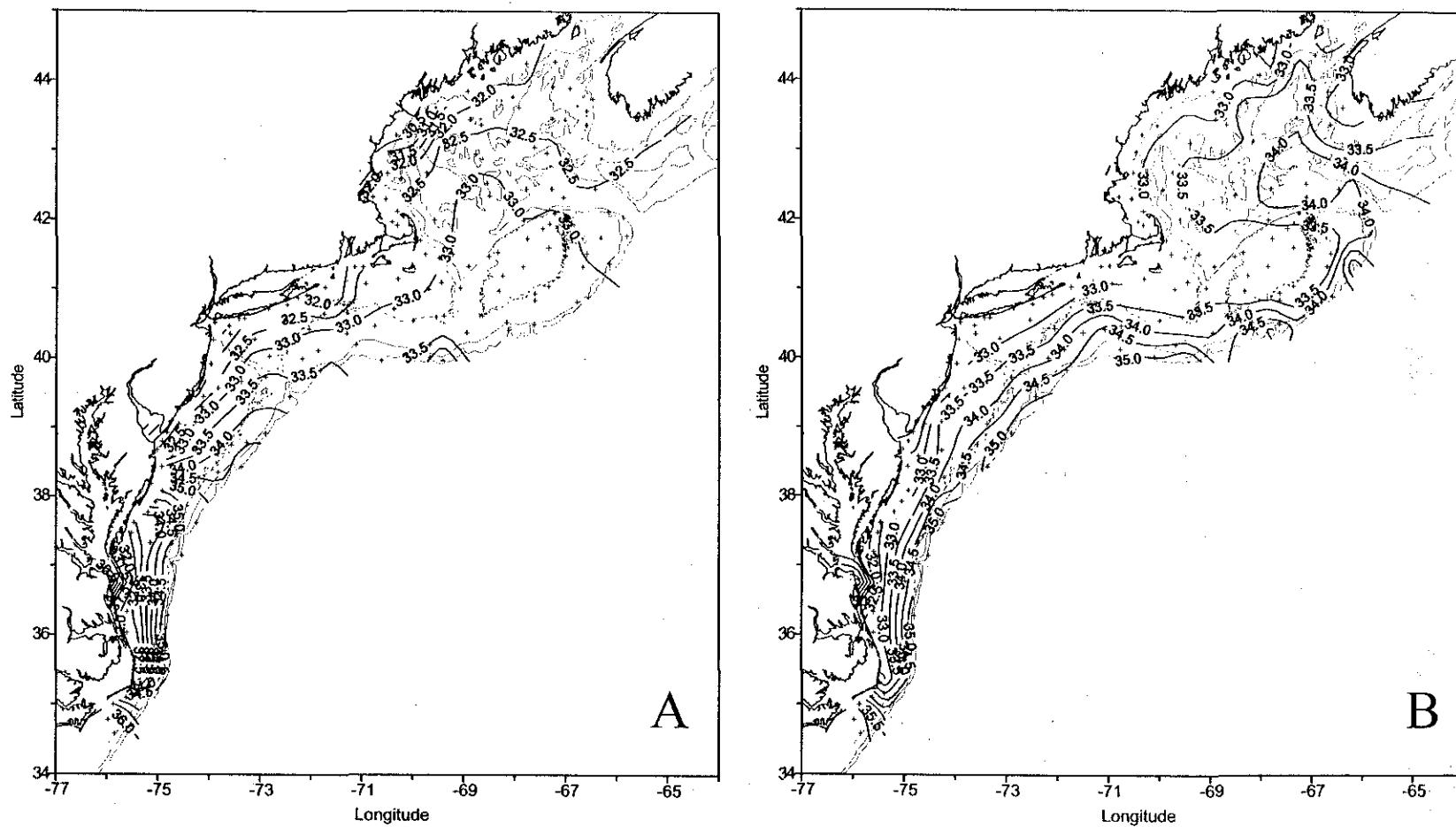


Figure 11. Surface (A) and bottom (B) salinity distributions for the Spring Bottom Trawl - ALB0002.

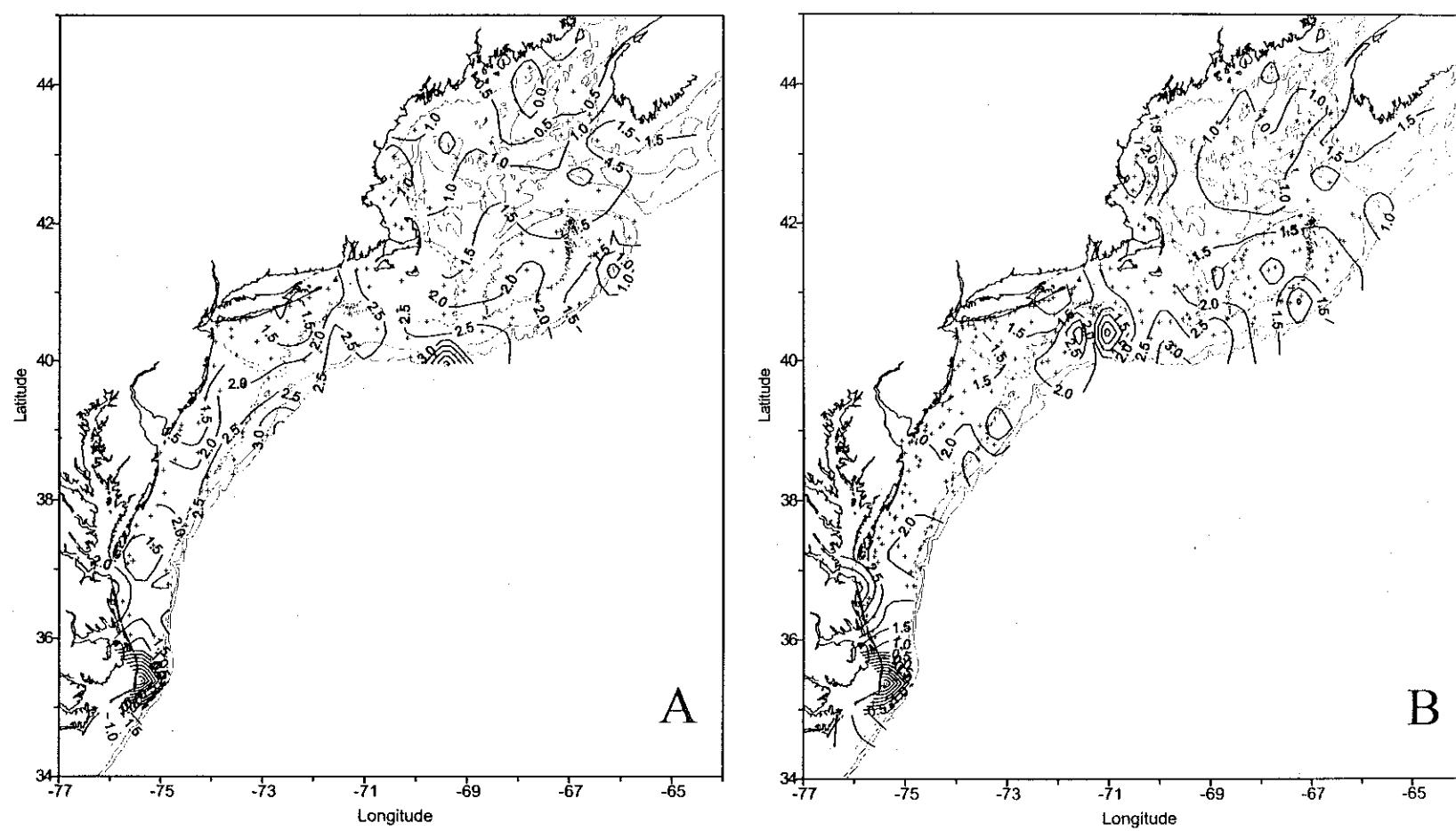


Figure 12. Surface (A) and bottom (B) temperature anomaly distributions for the Spring Bottom Trawl - ALB0002.

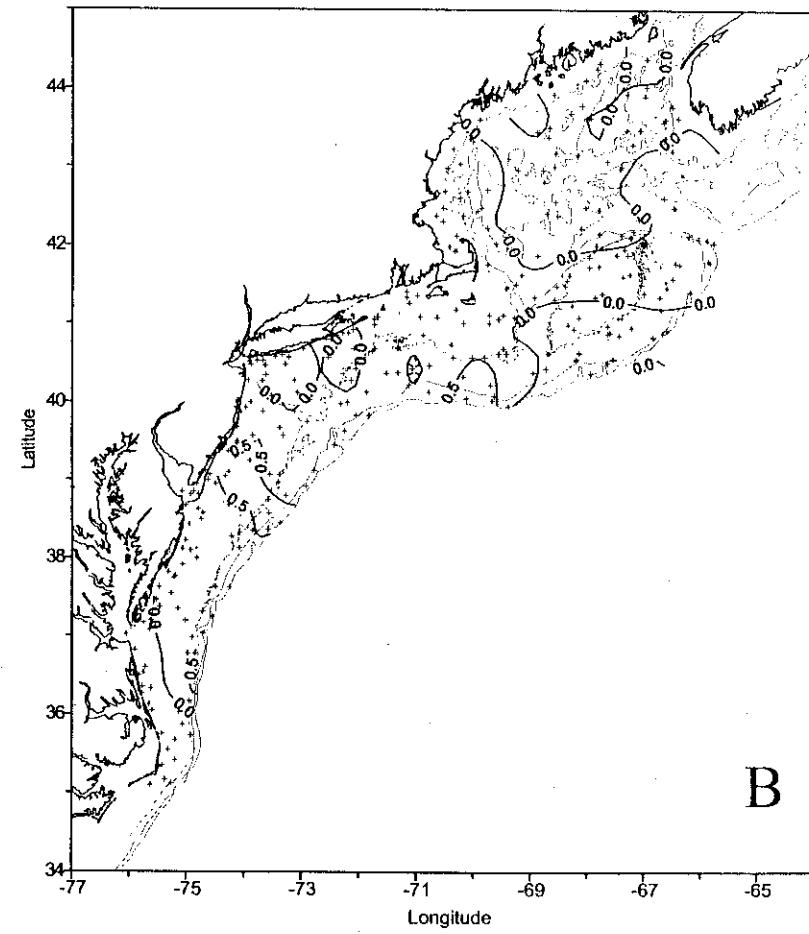
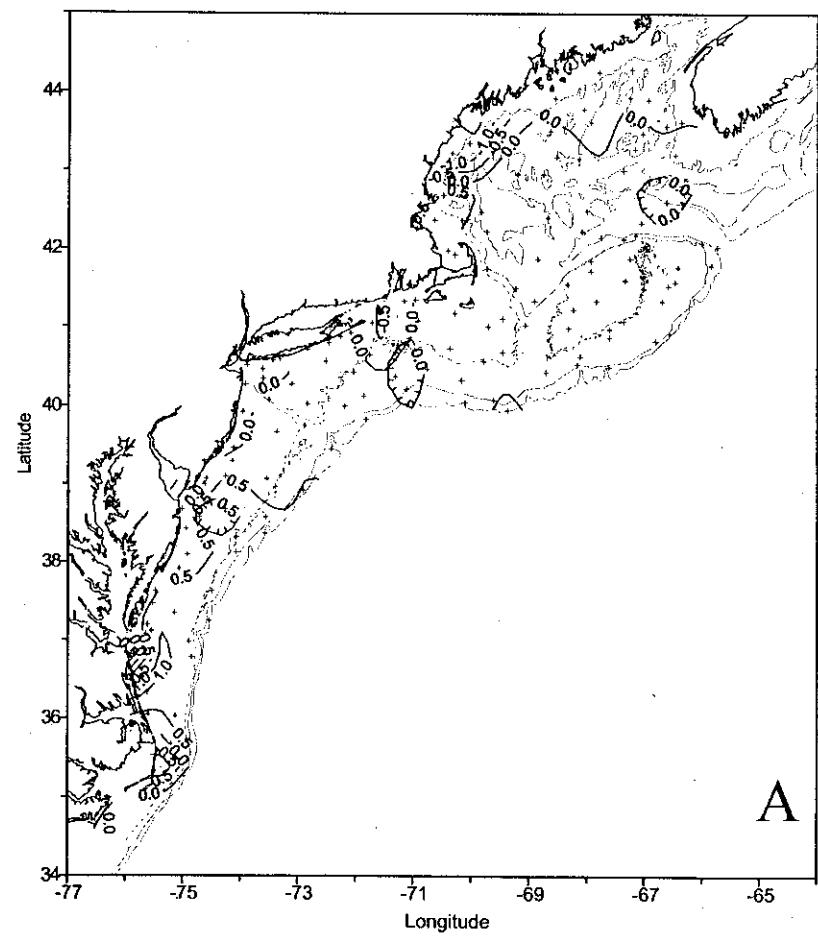
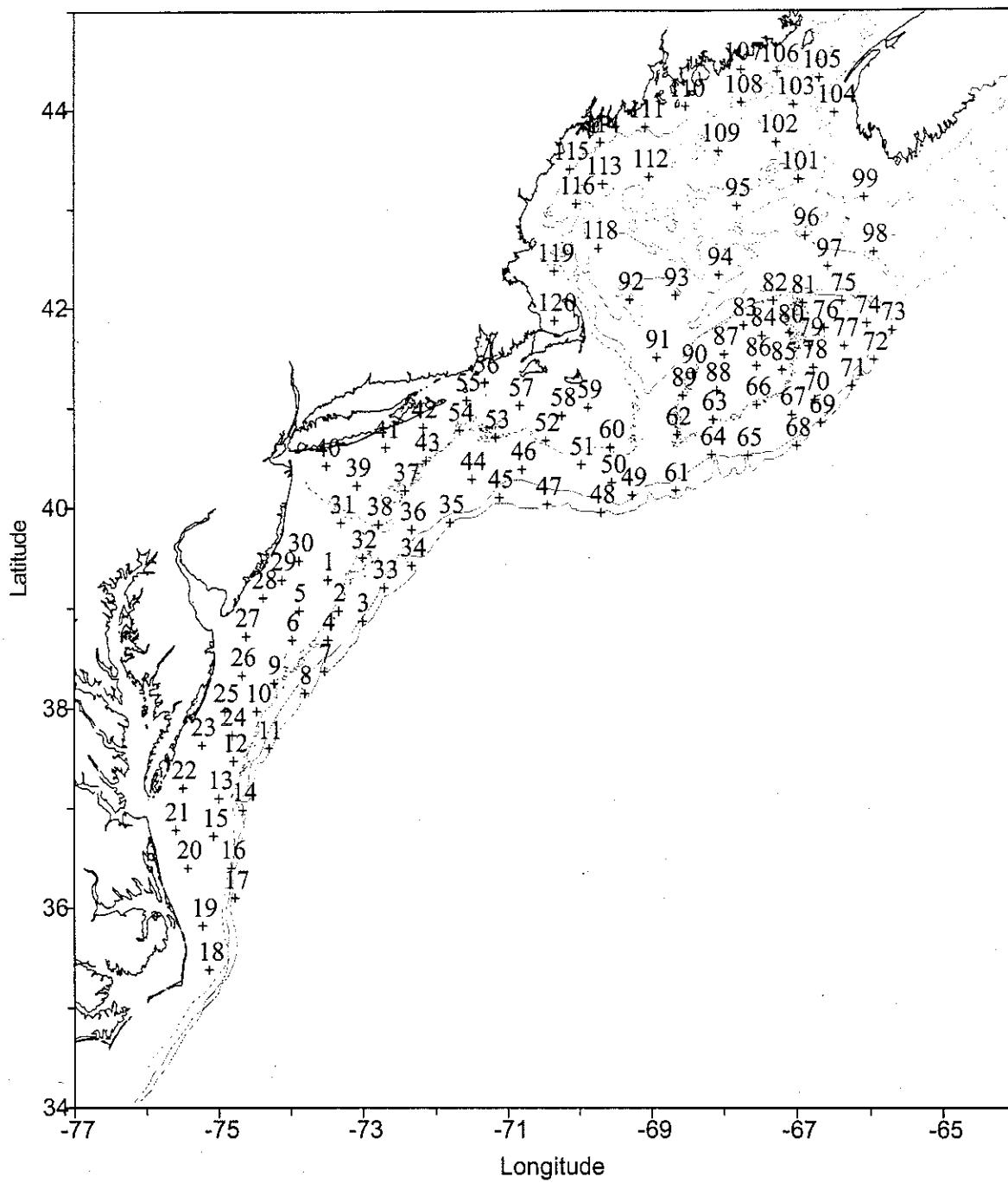


Figure 13. Surface (A) and bottom (B) salinity anomaly distributions for the Spring Bottom Trawl - ALB0002.



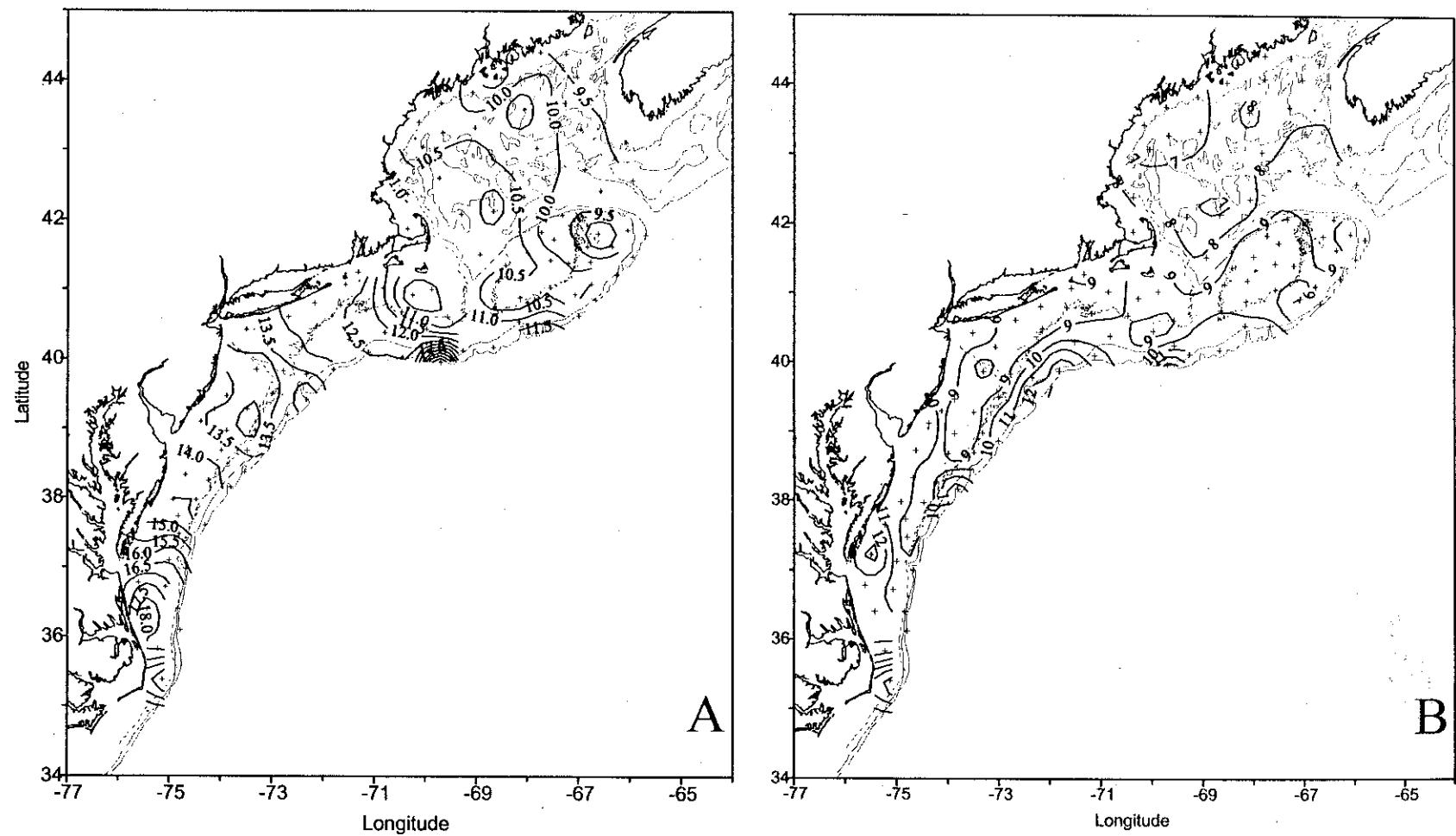


Figure 15. Surface (A) and bottom (B) temperature distributions for the ECOMON Survey - DEL0006.

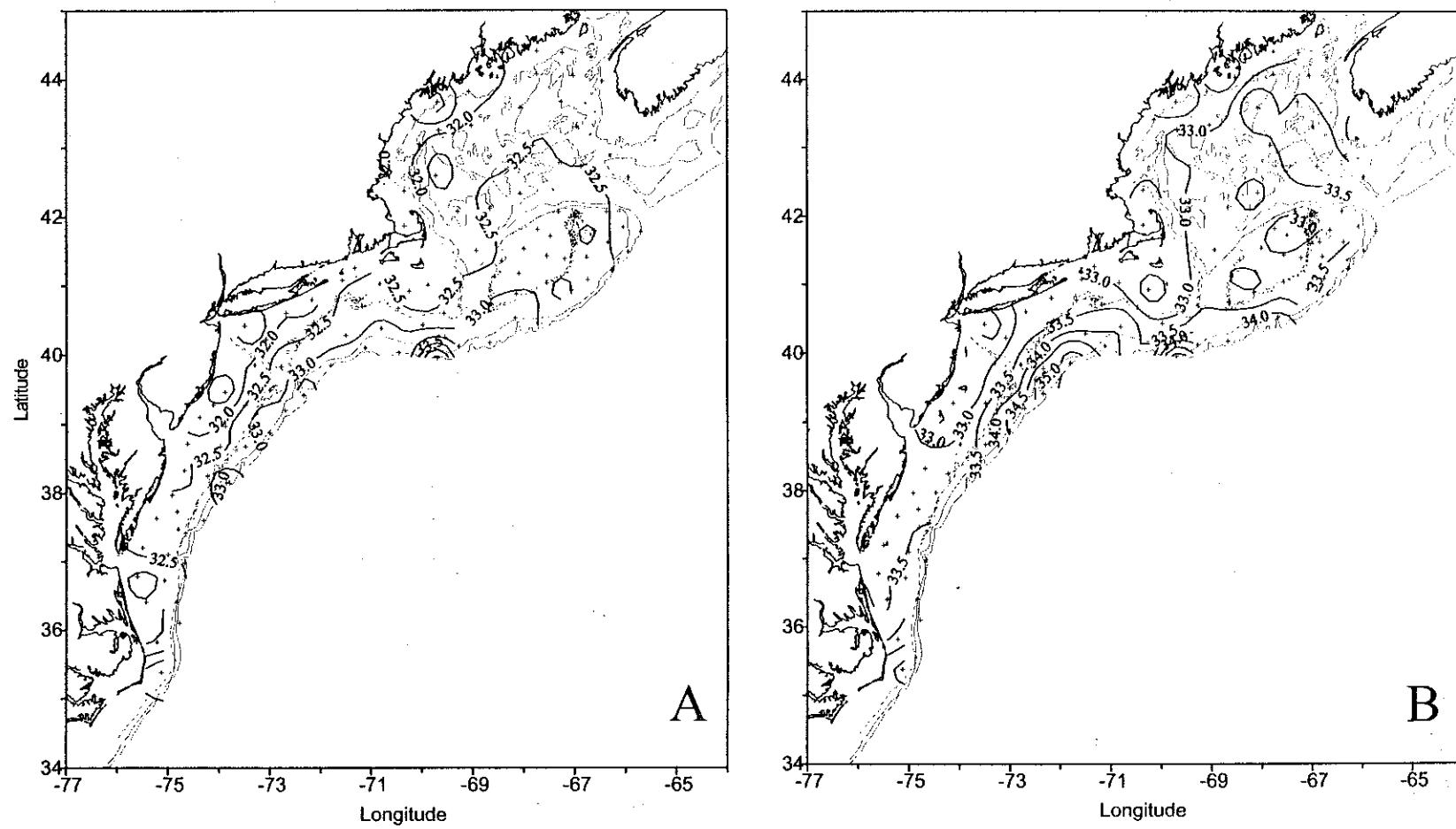
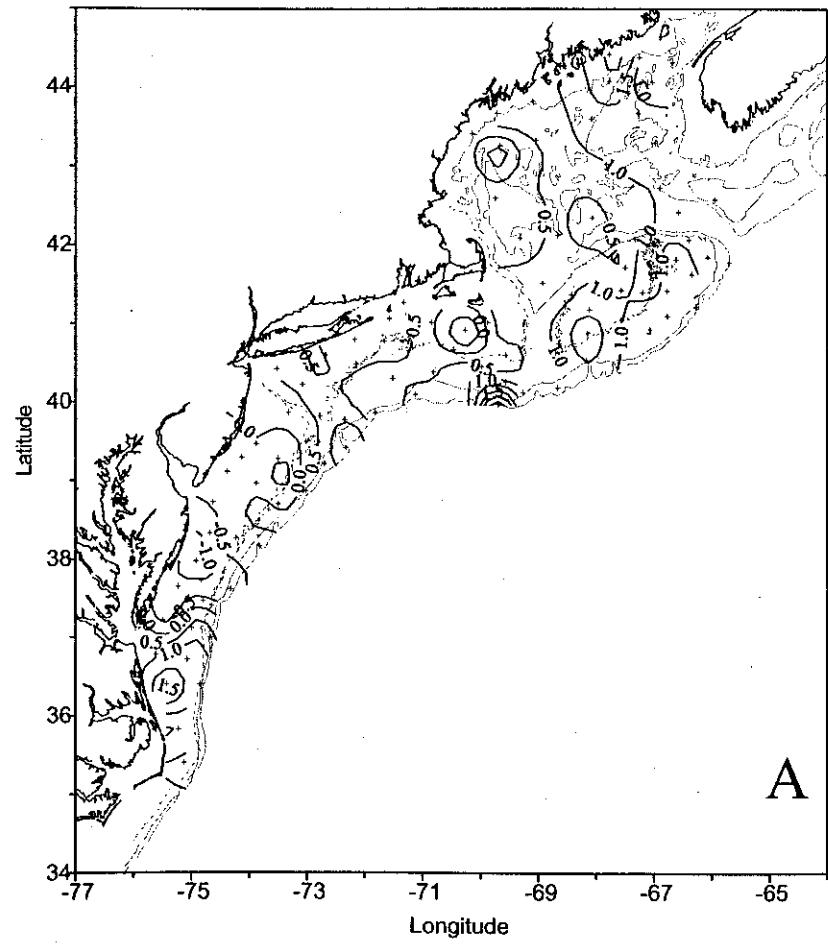
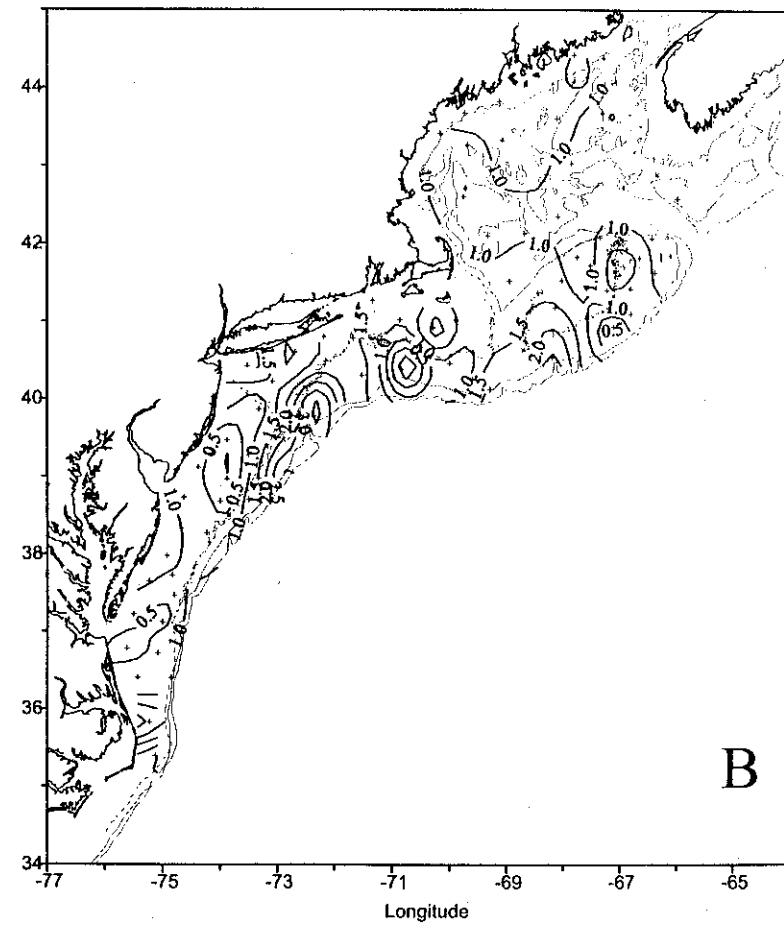


Figure 16. Surface (A) and bottom (B) salinity distributions for the ECOMON Survey DEL0006.



A



B

Figure 17. Surface (A) and bottom (B) temperature anomaly distributions for the ECOMON Survey - DEL0006.

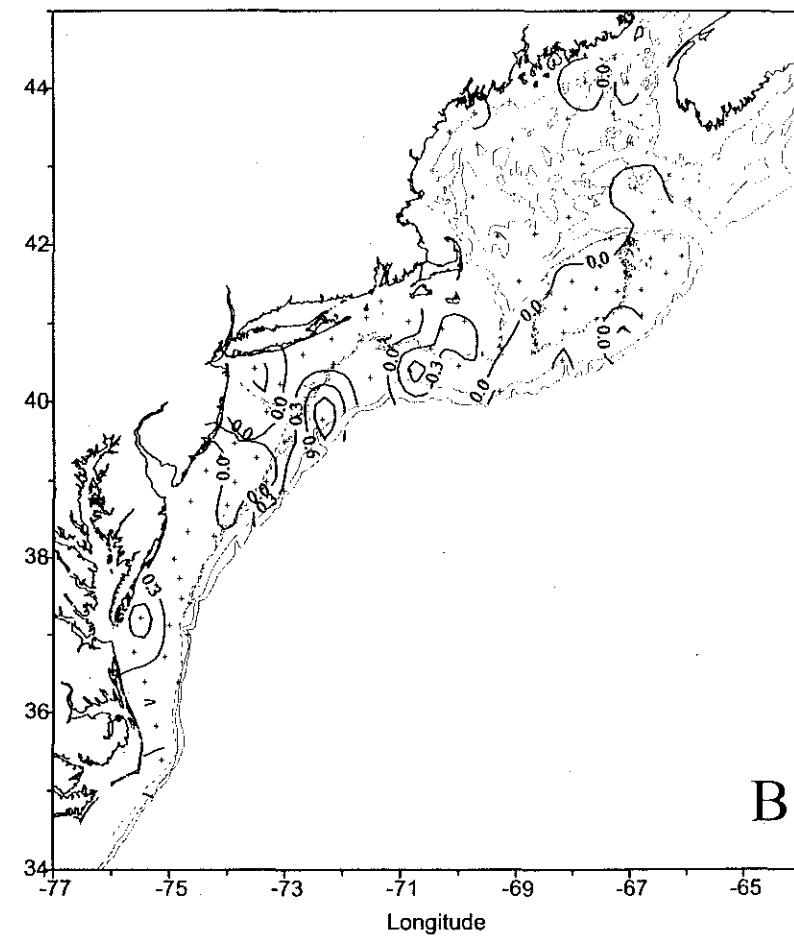
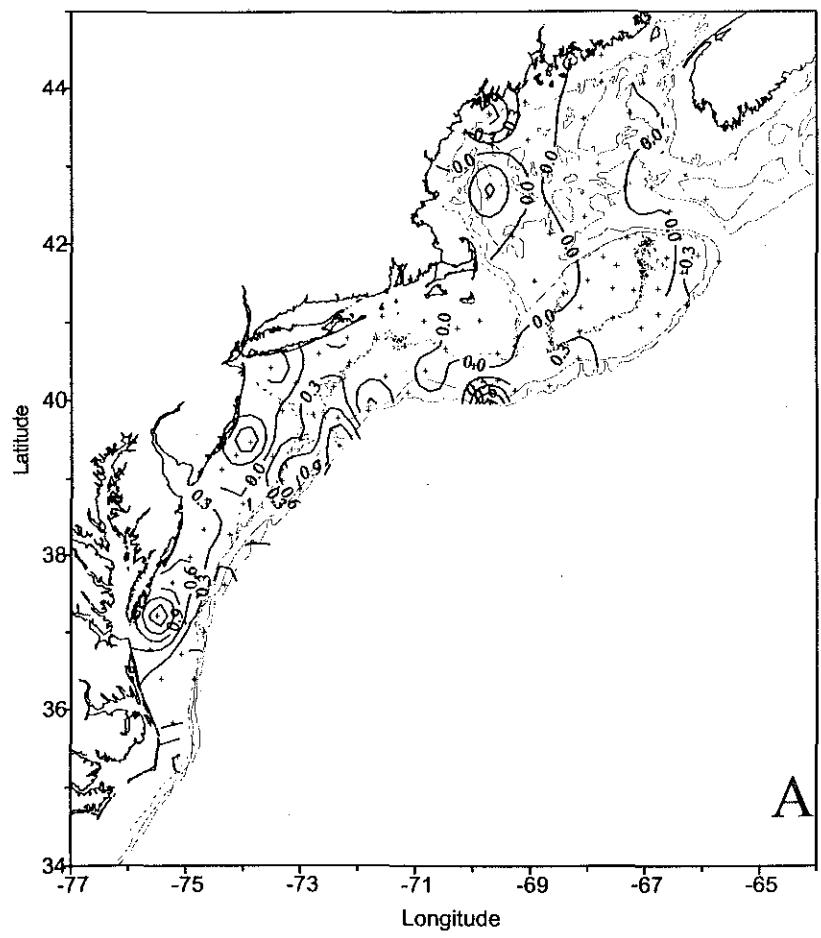


Figure 18. Surface (A) and bottom (B) salinity anomaly distributions for the ECOMON Survey - DEL0006.

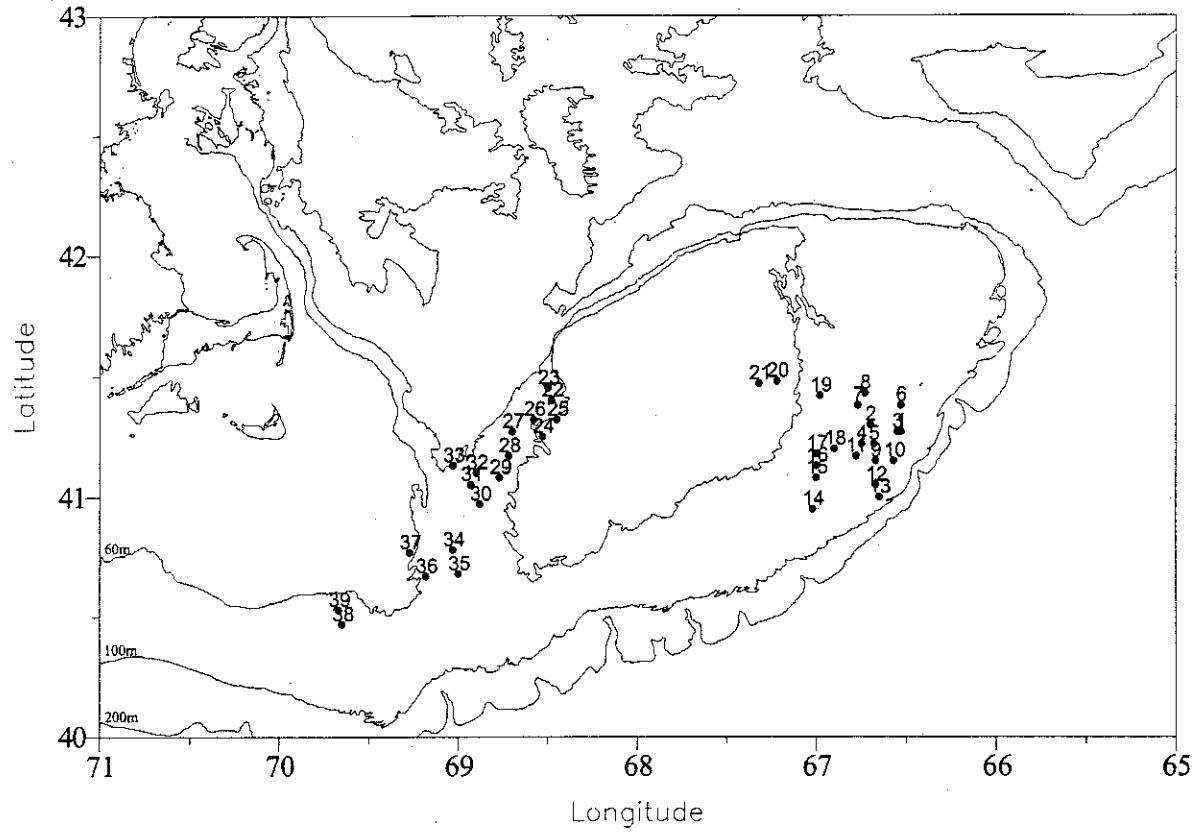


Figure 19. Stations occupied during the Benthic Habitat cruise - ALB0003.

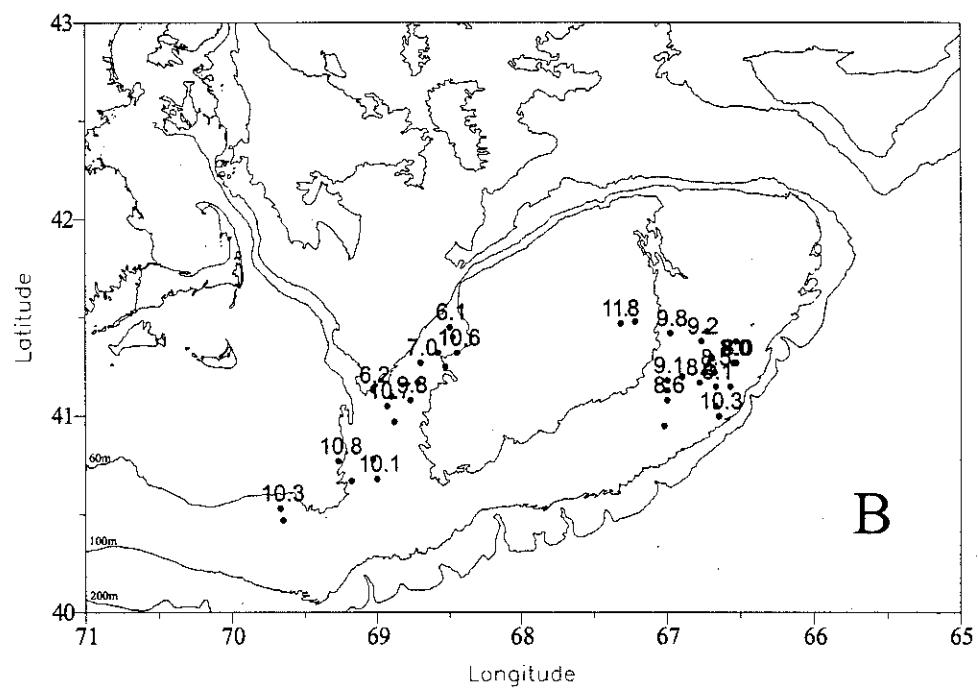
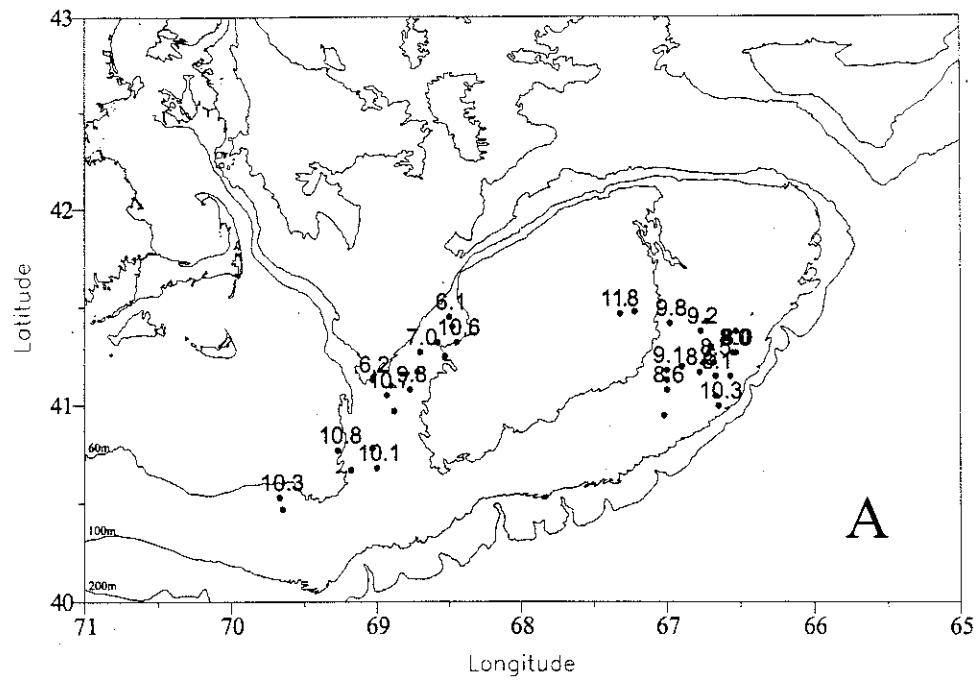


Figure 20. Surface (A) and bottom (B) temperature distributions for the Benthic Habitat cruise - ALB0003.

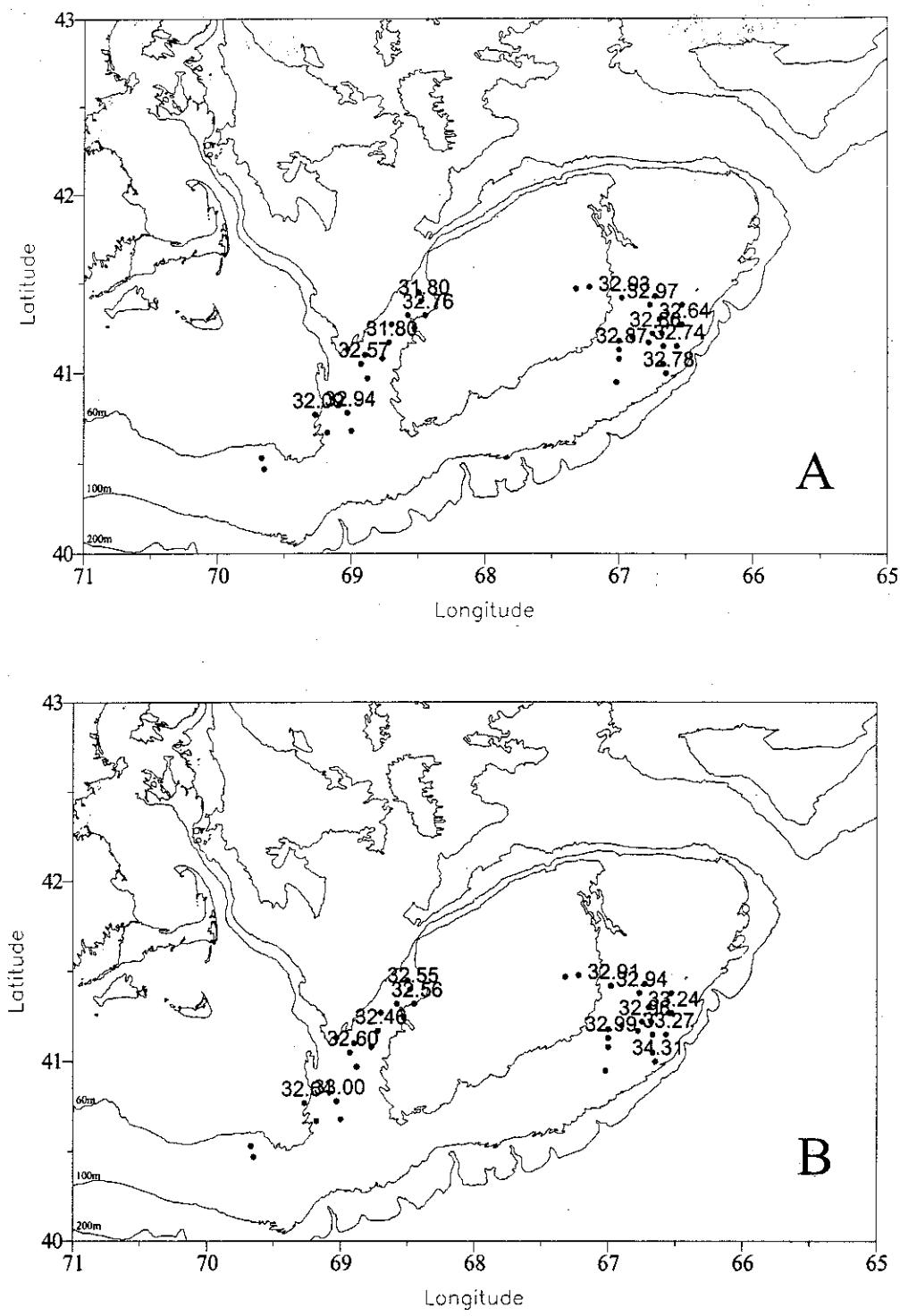


Figure 21. Surface (A) and bottom (B) salinity distributions for the Benthic Habitat cruise - ALB0003.

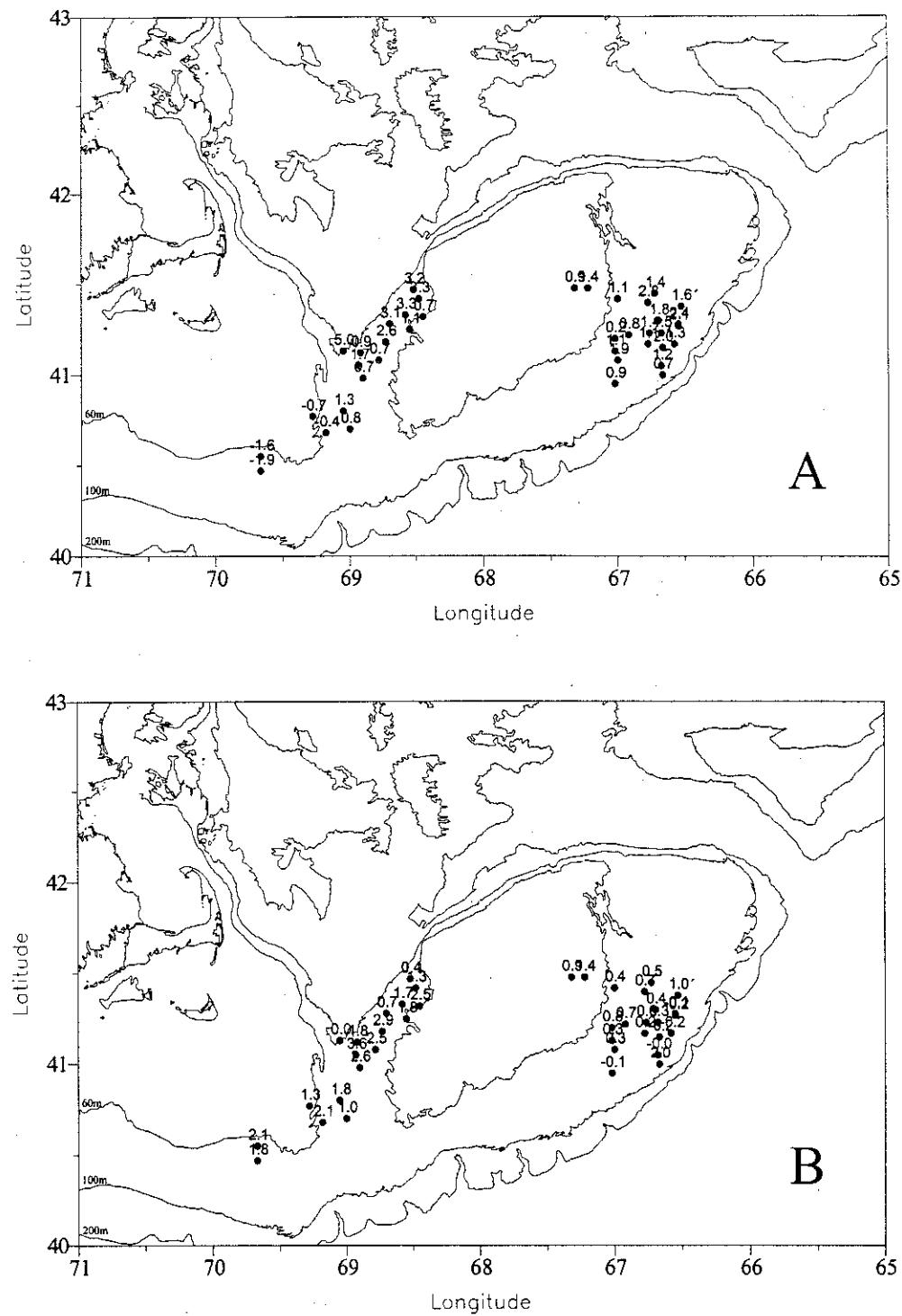


Figure 22. Surface (A) and bottom (B) temperature anomaly distributions for the Benthic Habitat cruise - ALB0003.

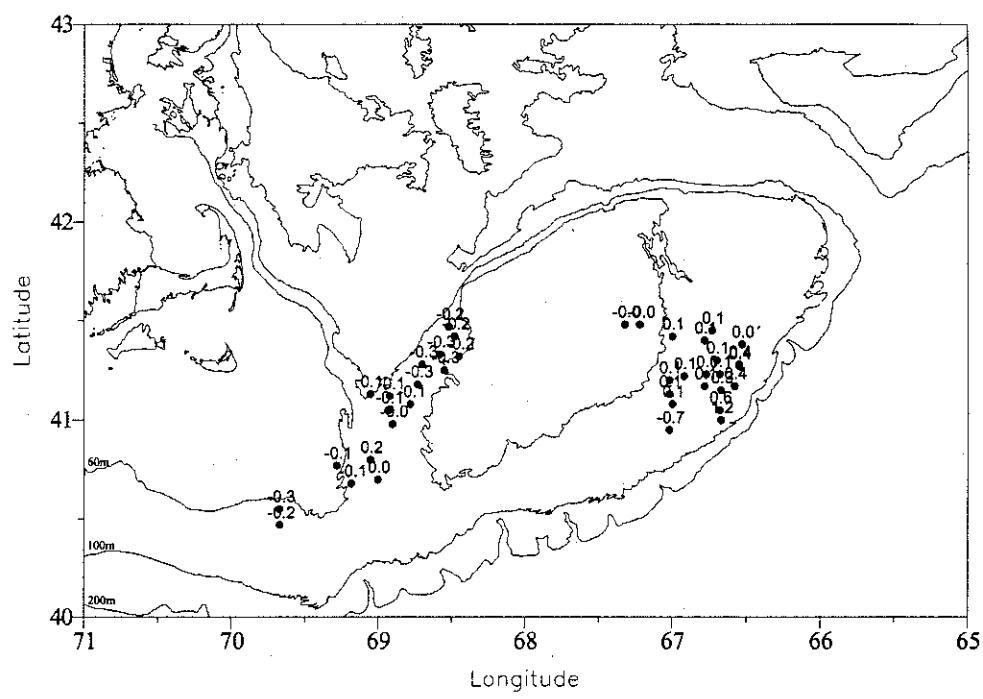
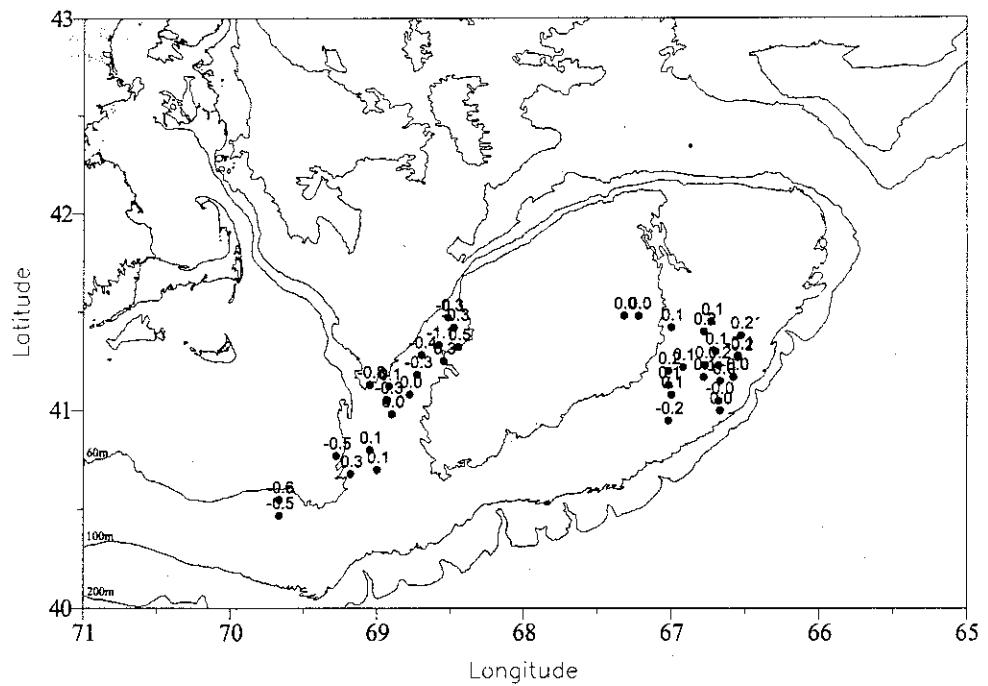


Figure 23. Surface (A) and bottom (B) salinity distributions for the Benthic Habitat cruise - ALB0003.

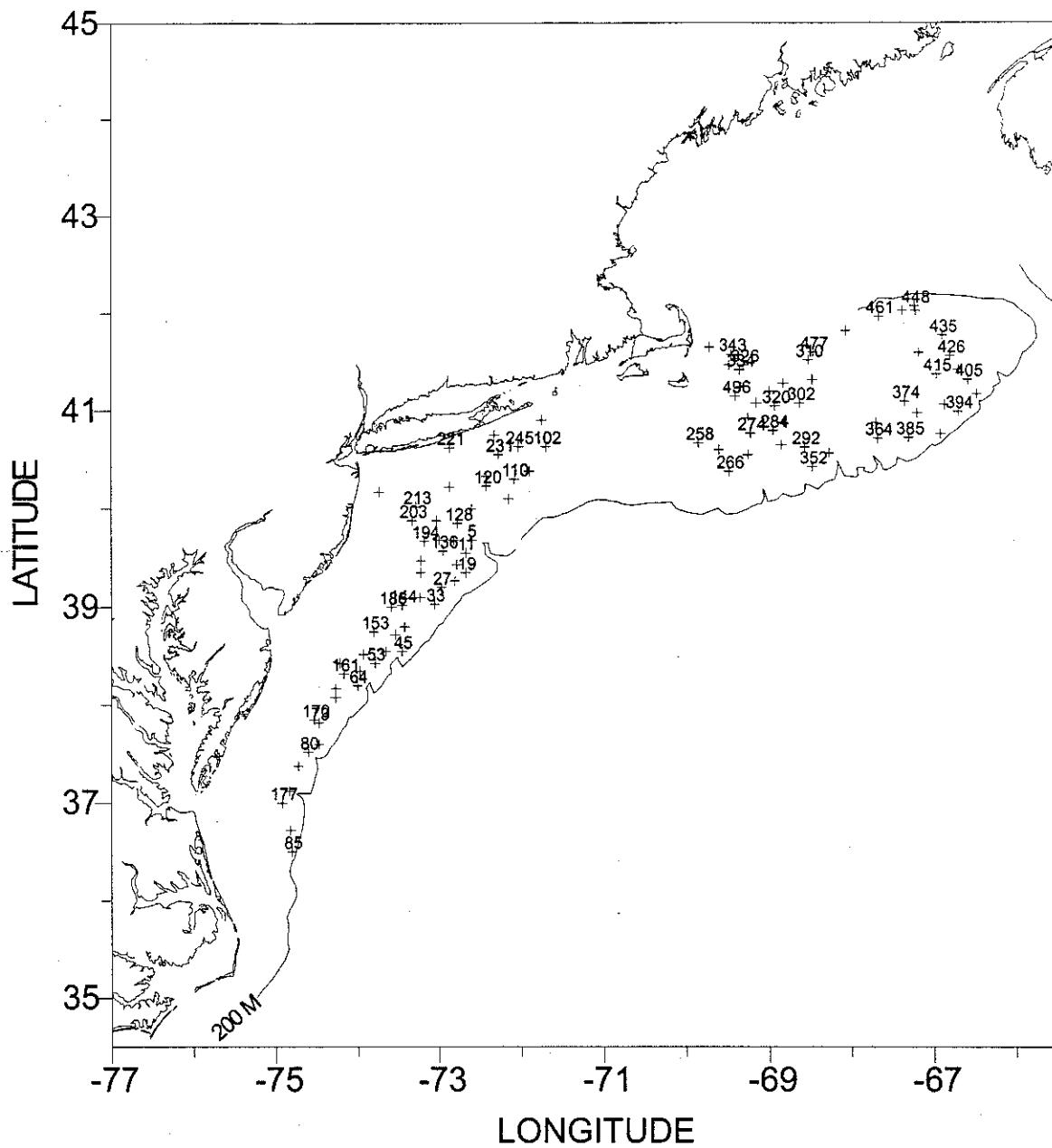


Figure 24. Hydrographic stations occupied during the Scallop Survey - ALB0004.

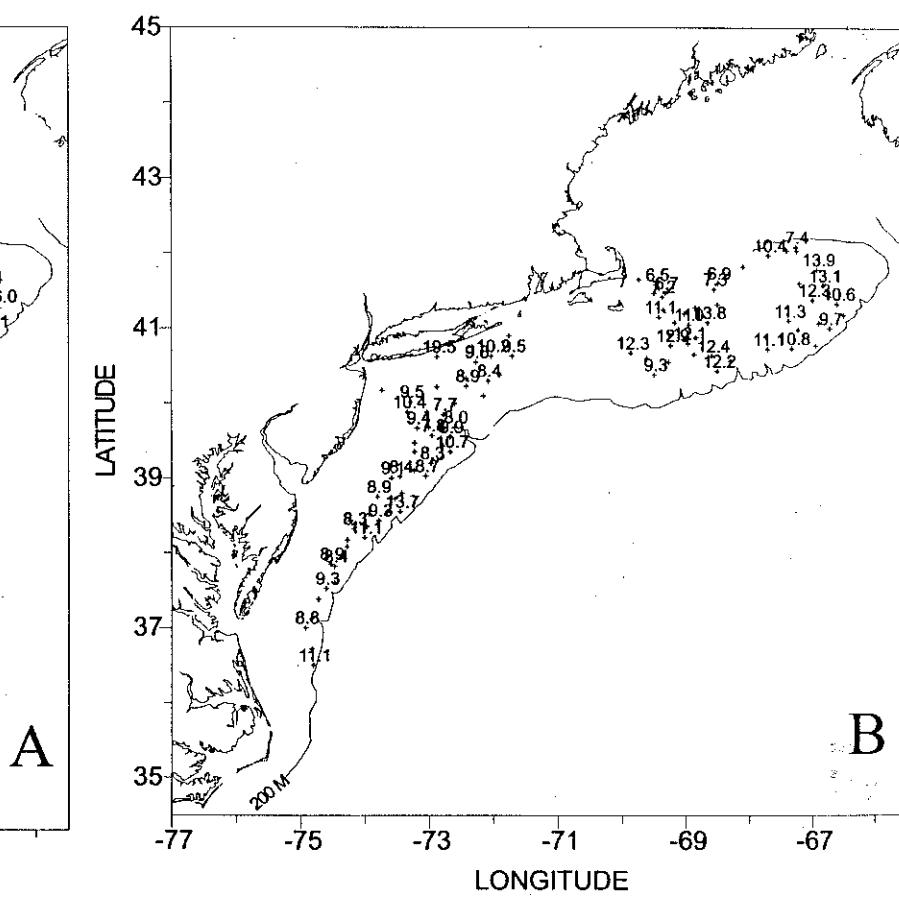
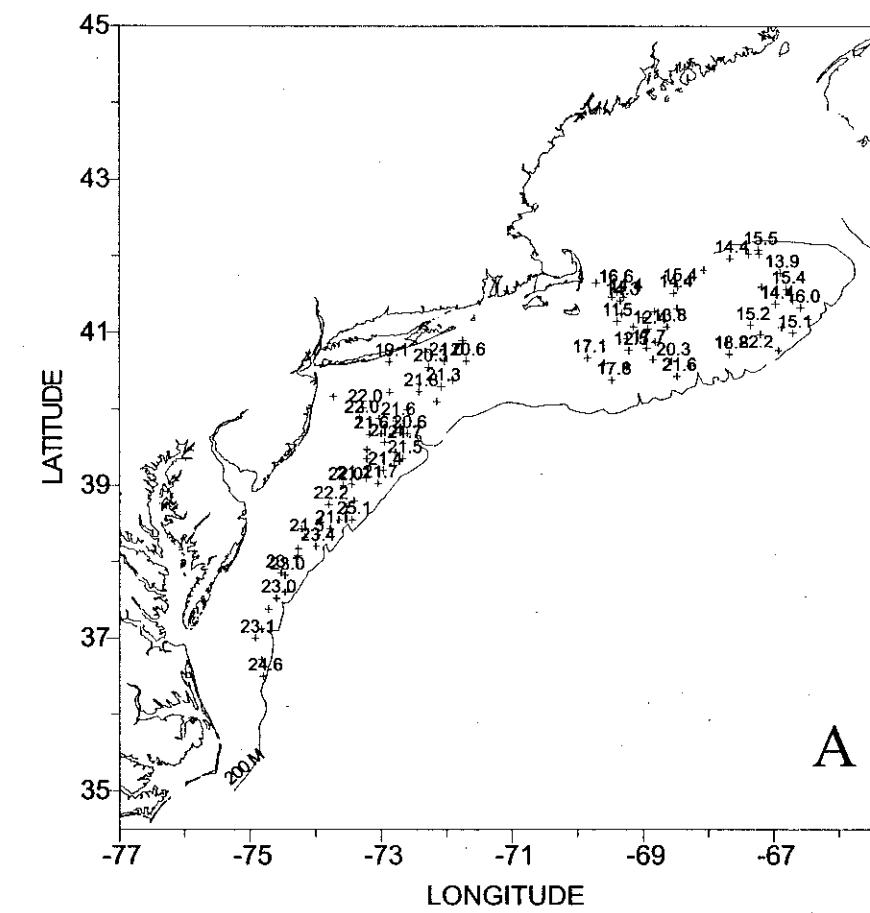
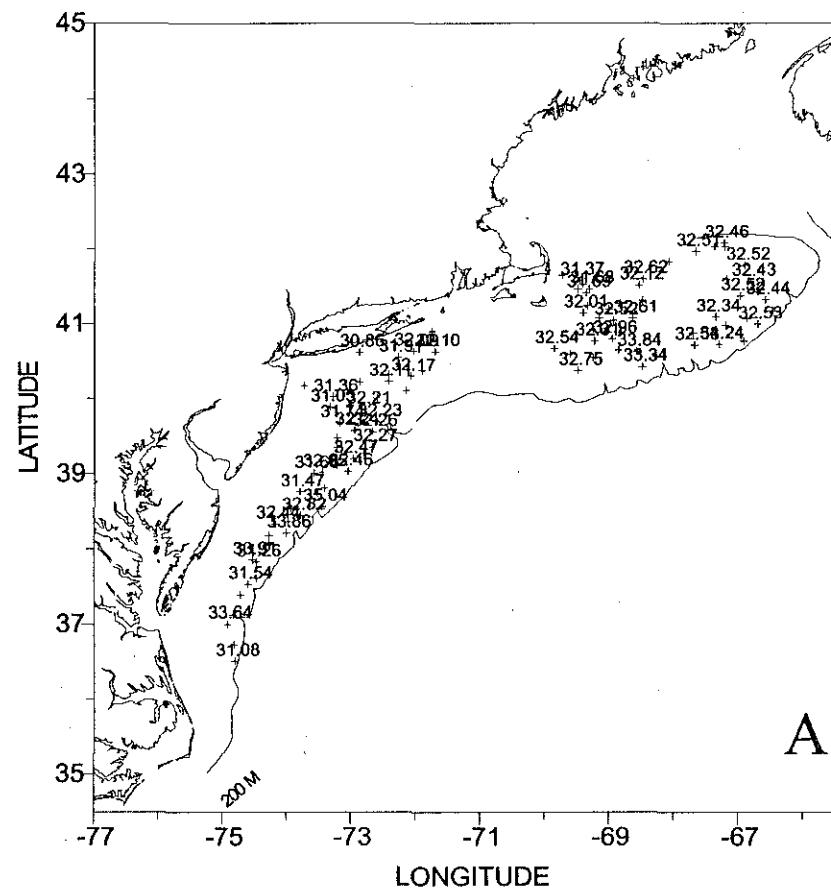
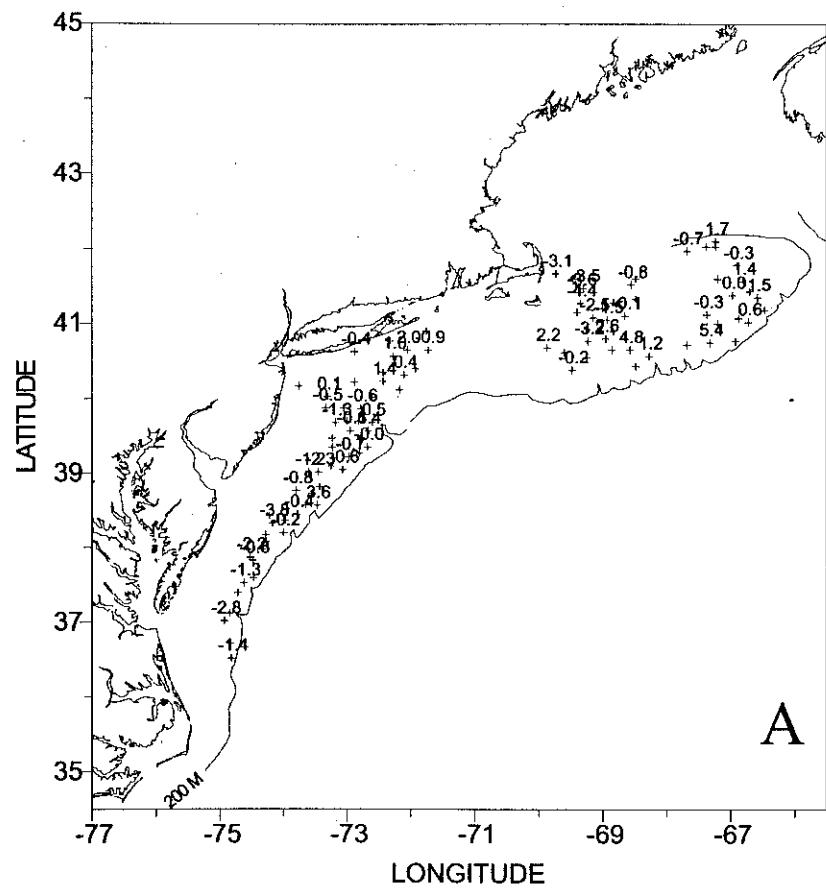
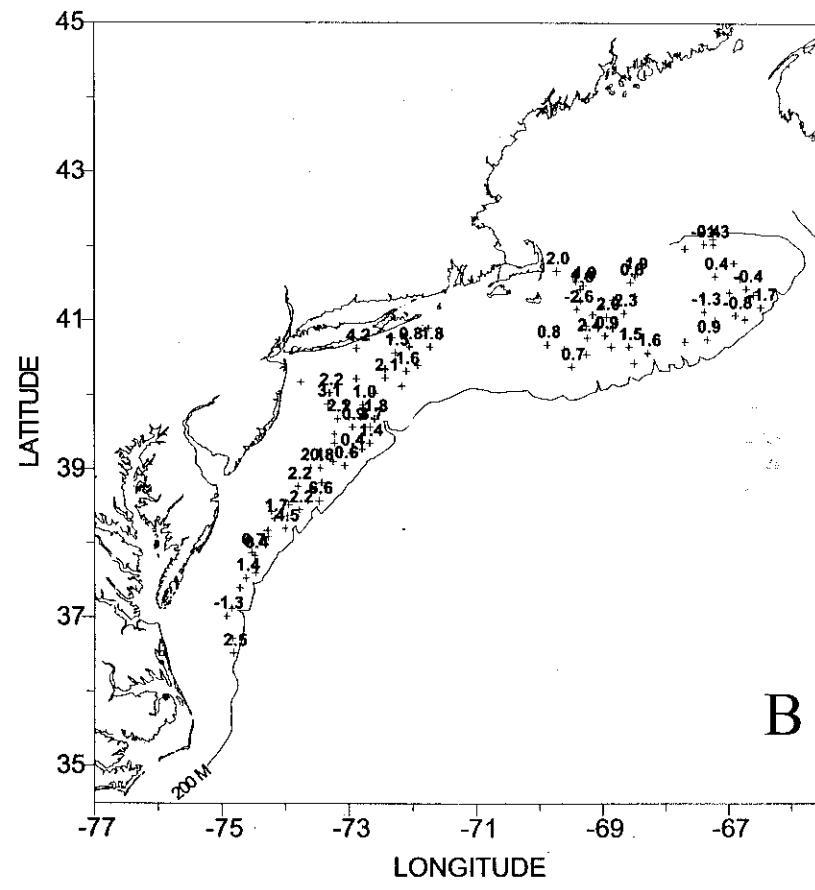


Figure 25. Surface (A) and bottom (B) temperature distributions for the Scallop Survey - ALB0004.





A



B

Figure 27. Surface (A) and bottom (B) temperature anomaly distributions for the Scallop Survey - ALB0004.

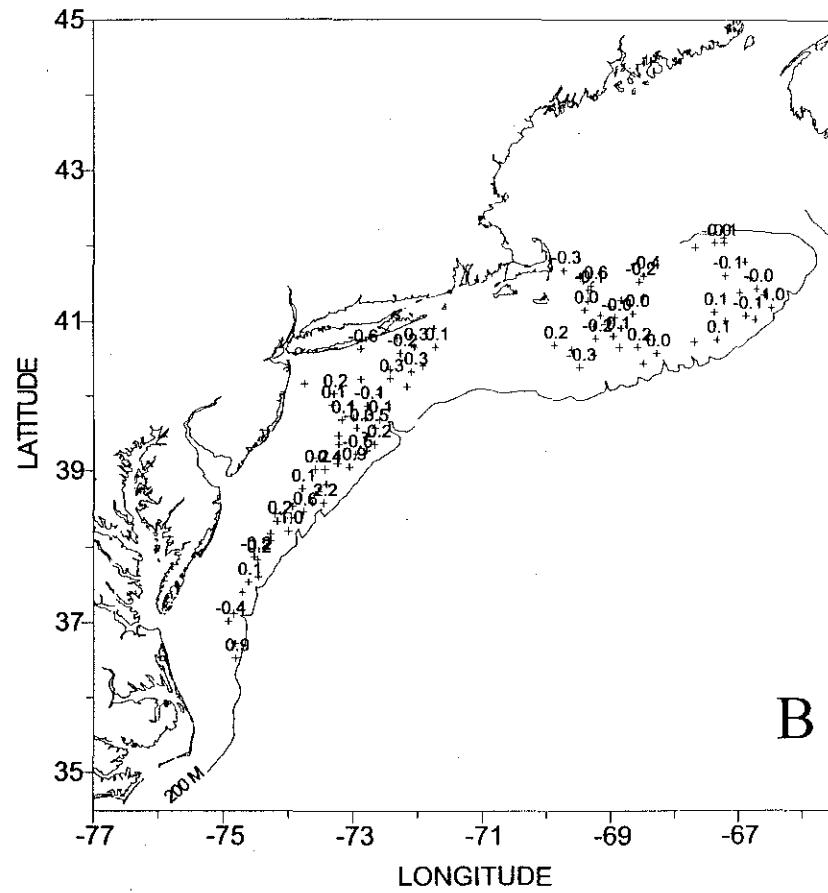
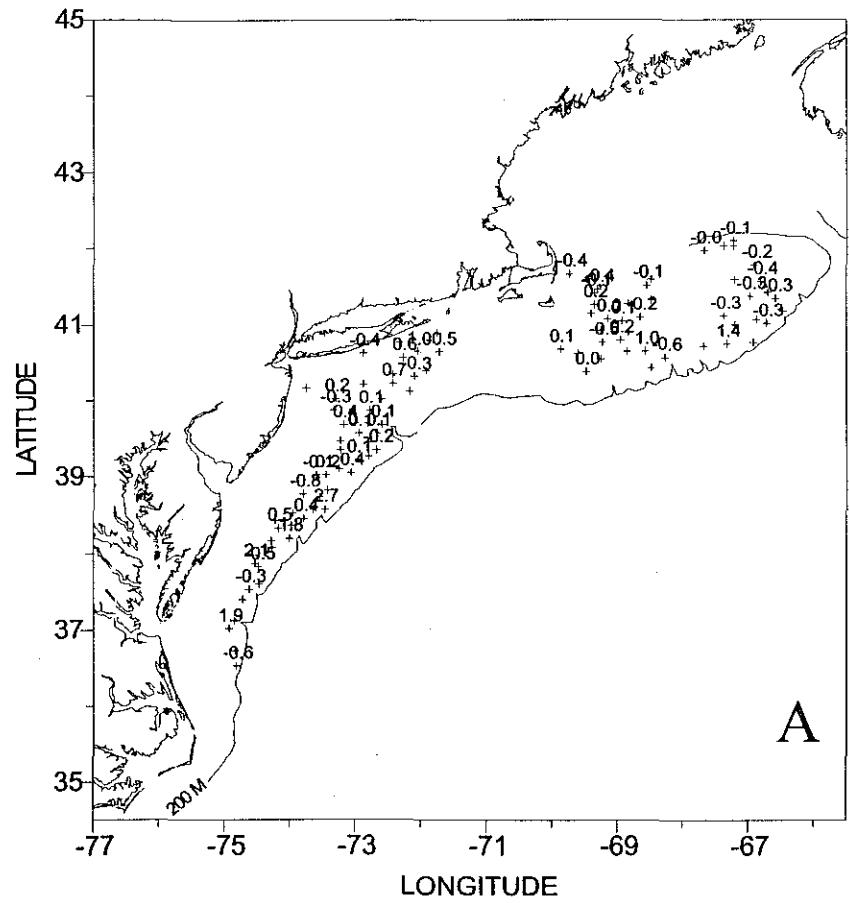


Figure 28. Surface (A) and bottom (B) salinity anomaly distributions for the Scallop Survey - ALB0004.

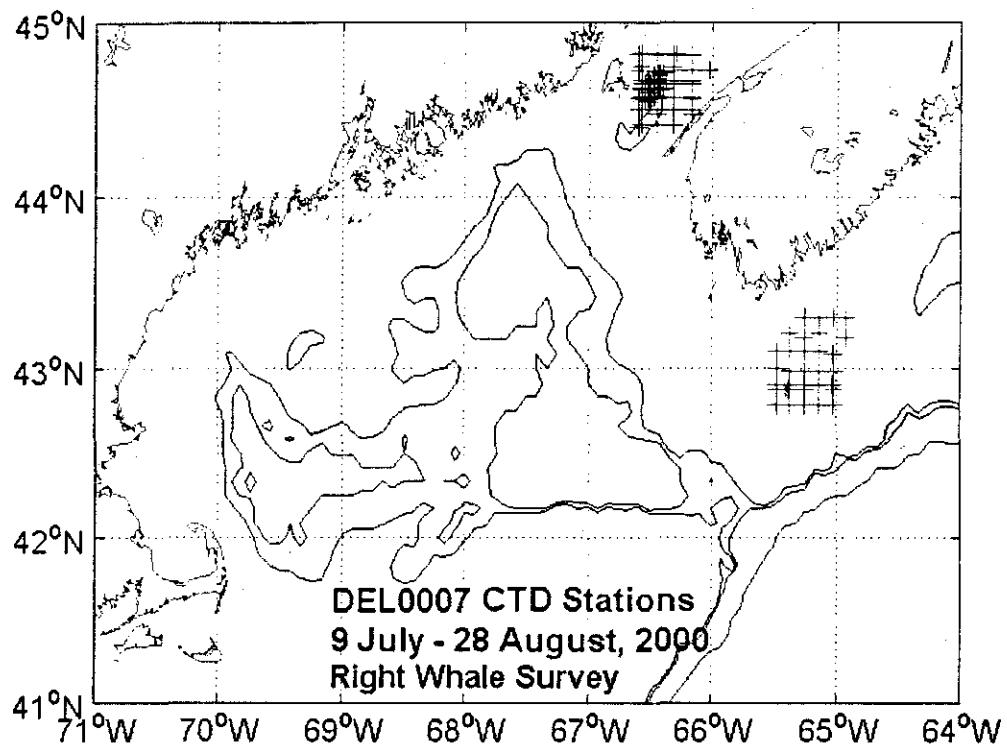


Figure 29. Hydrographic stations occupied during the Right Whale Survey DEL0007.

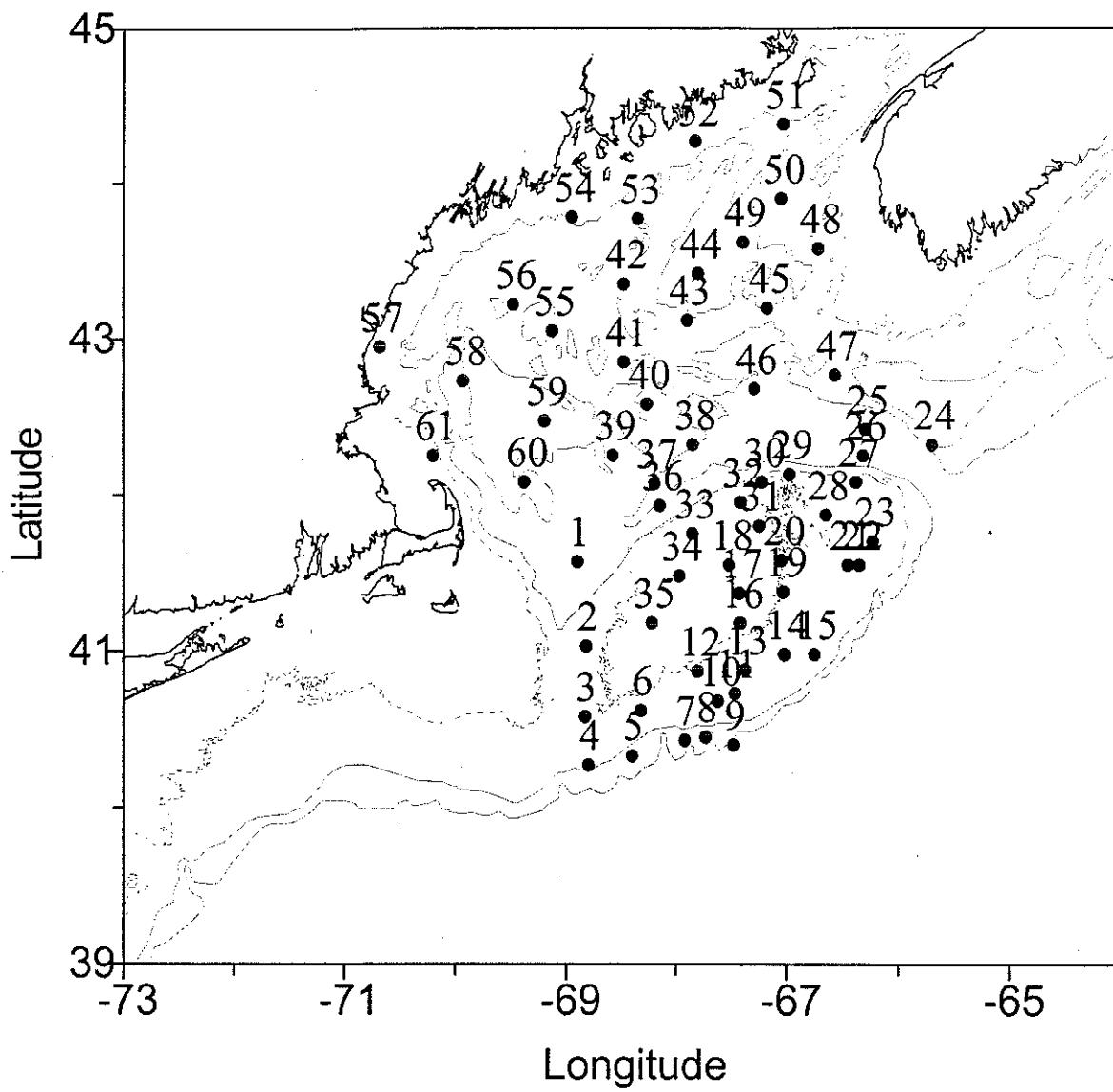


Figure 30. Hydrographic stations occupied during the ECOMON survey  
ALB0005.

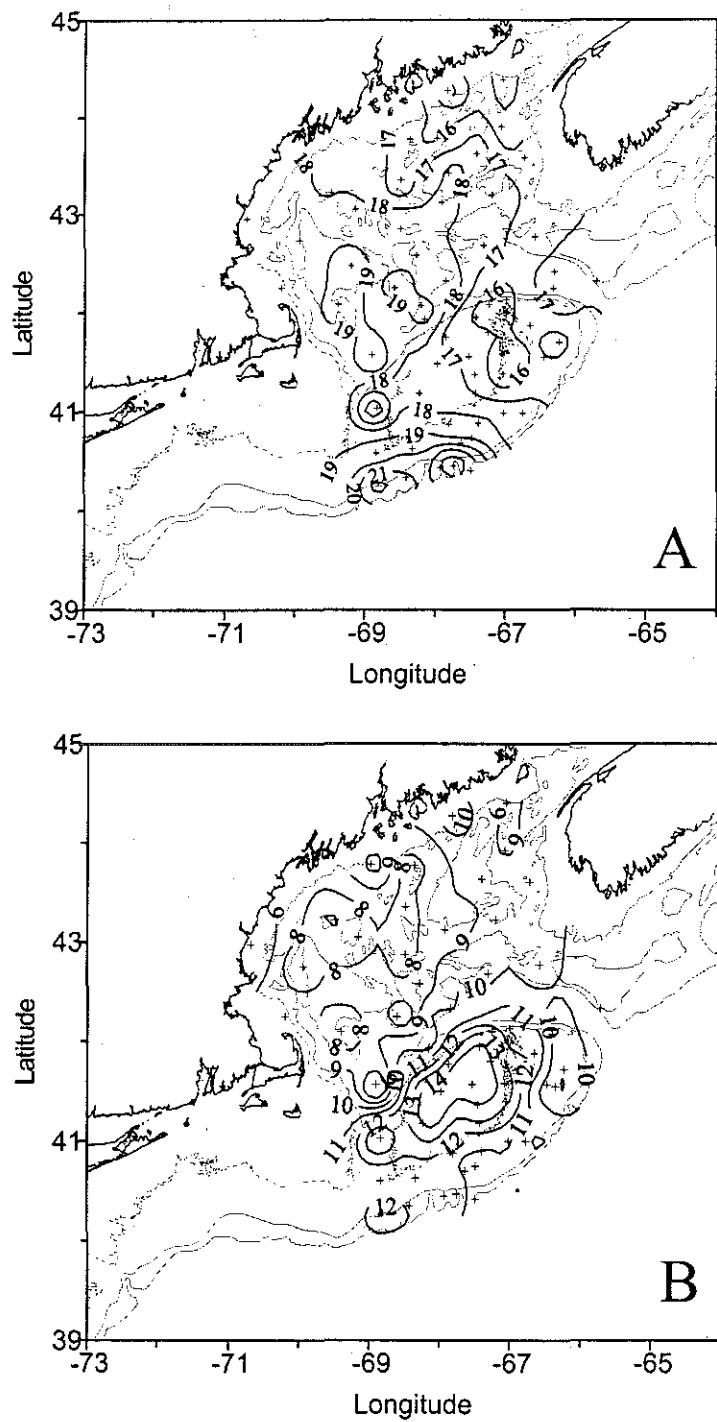


Figure 31. Surface (A) and bottom (B) temperature distributions for the ECOMON Survey ALB0005.

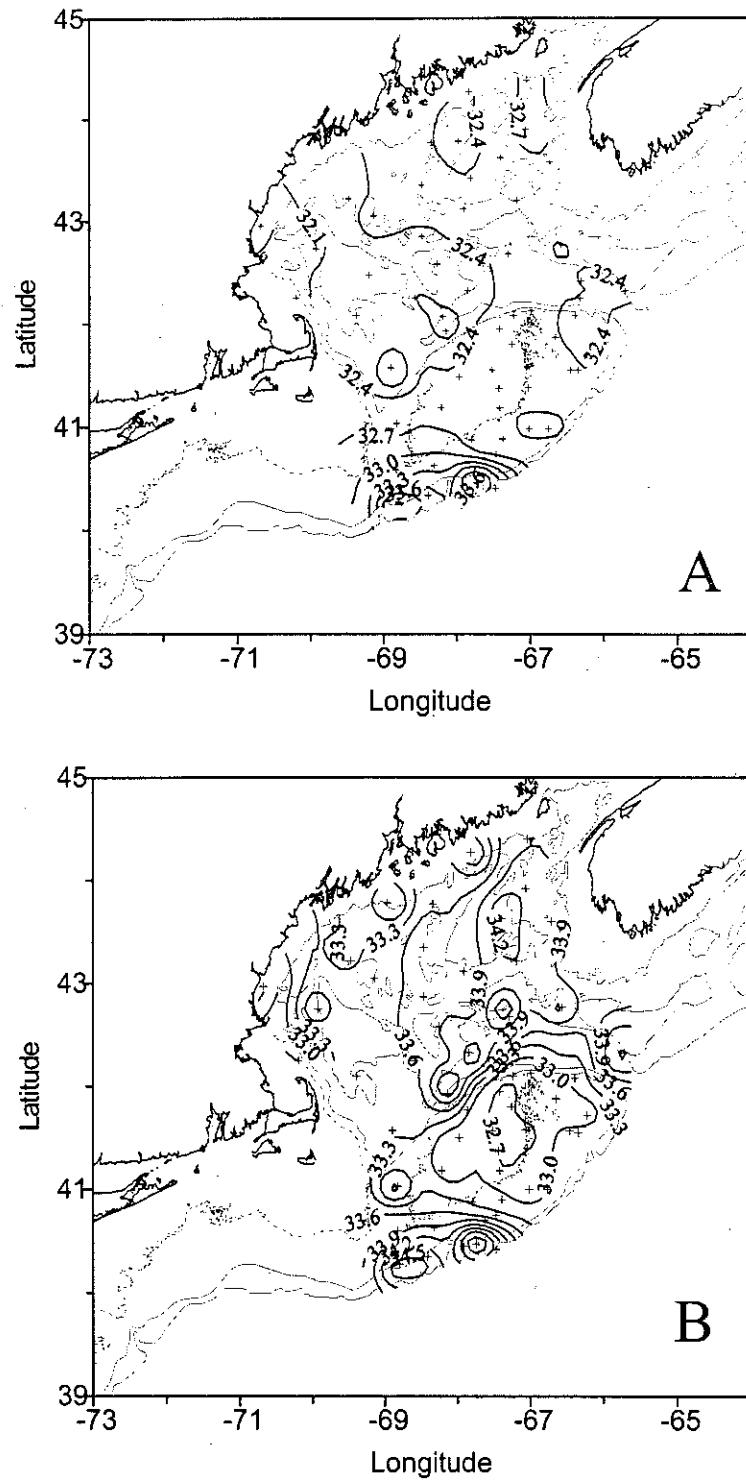


Figure 32. Surface (A) and bottom (B) salinity distributions for the ECOMON Survey ALB0005.

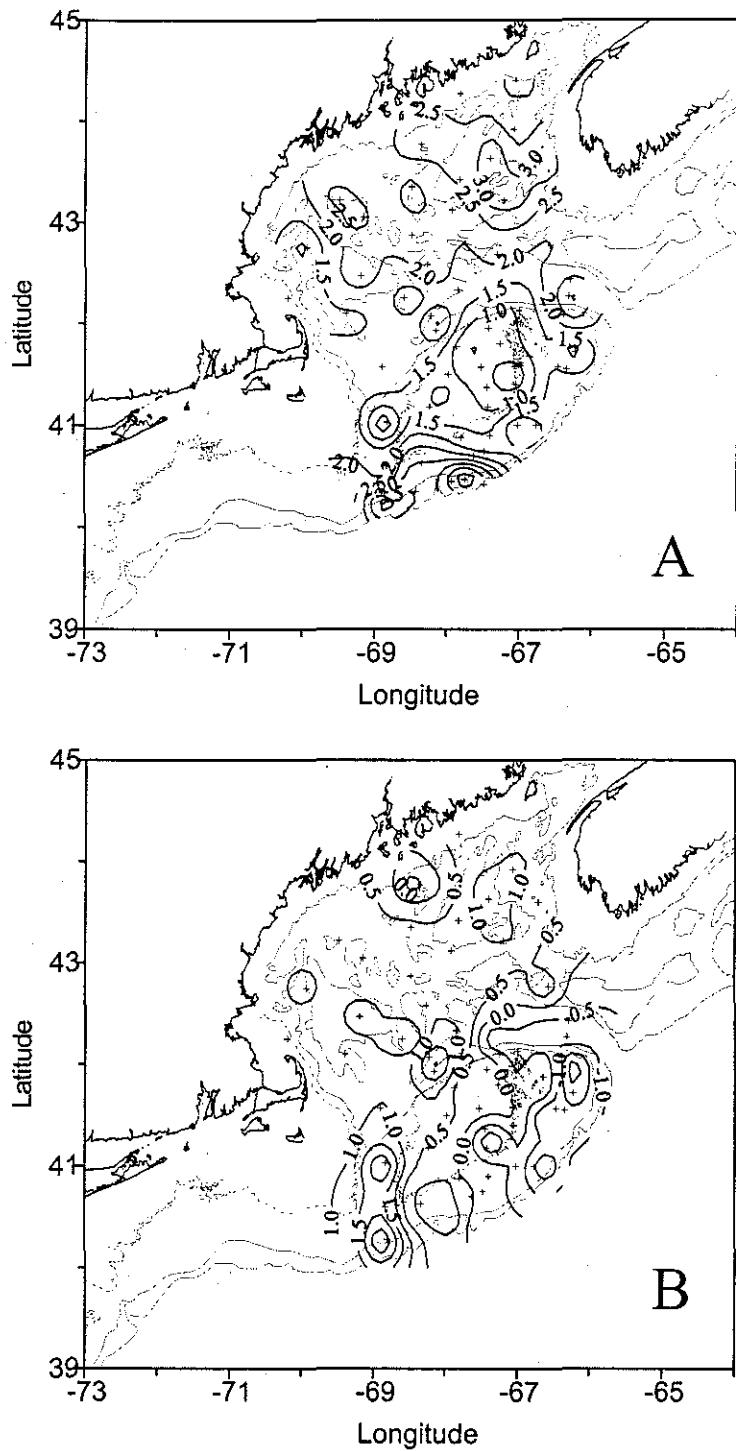


Figure 33. Surface (A) and bottom (B) temperature anomaly distributions for ECOMON survey ALB0005.

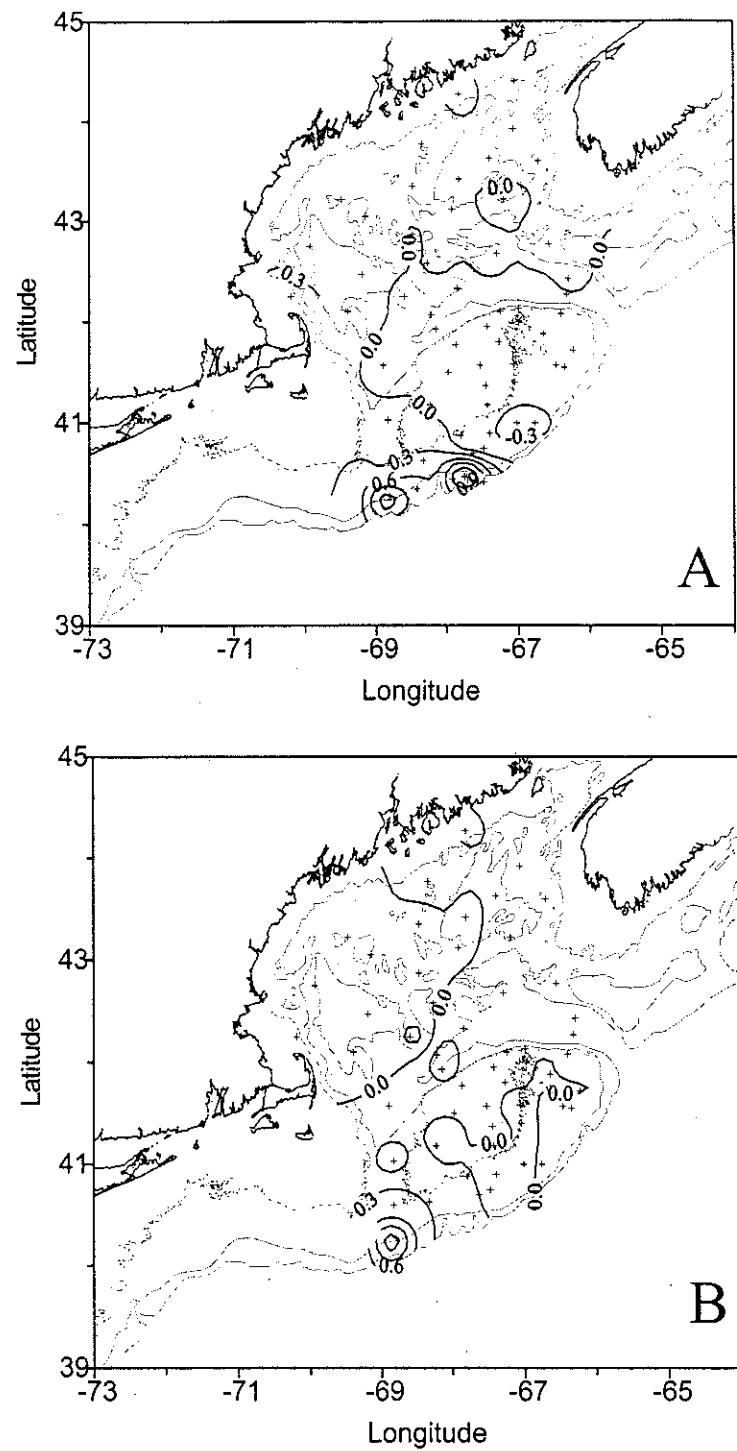


Figure 34. Surface (A) and bottom (B) salinity anomaly distributions for the ECOMON survey ALB0005.

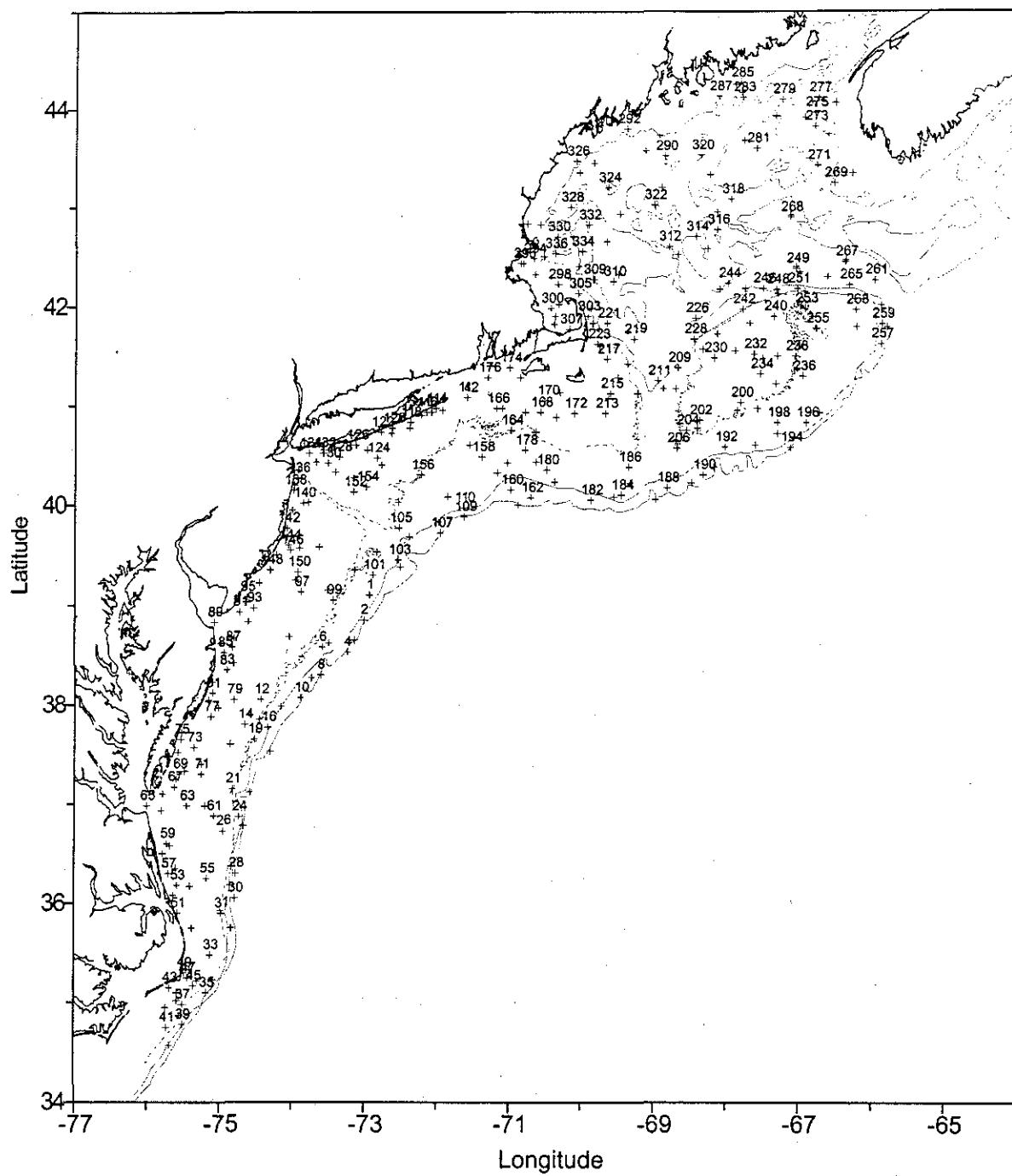


Figure 35. Hydrographic stations occupied during the Fall Bottom Trawl ALB0006.

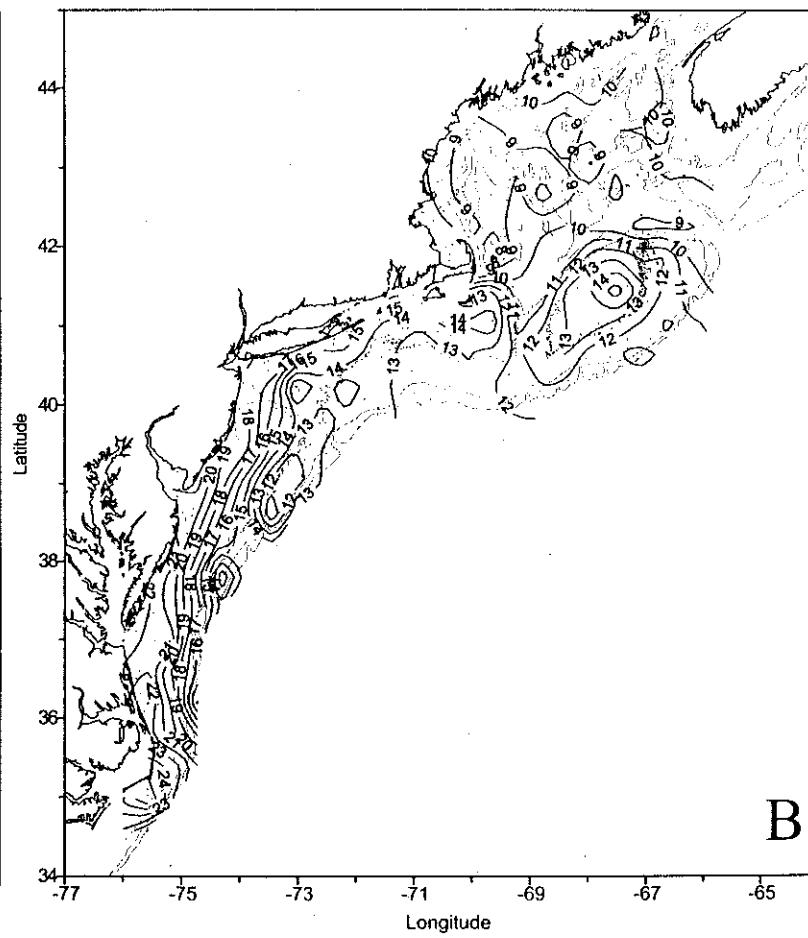
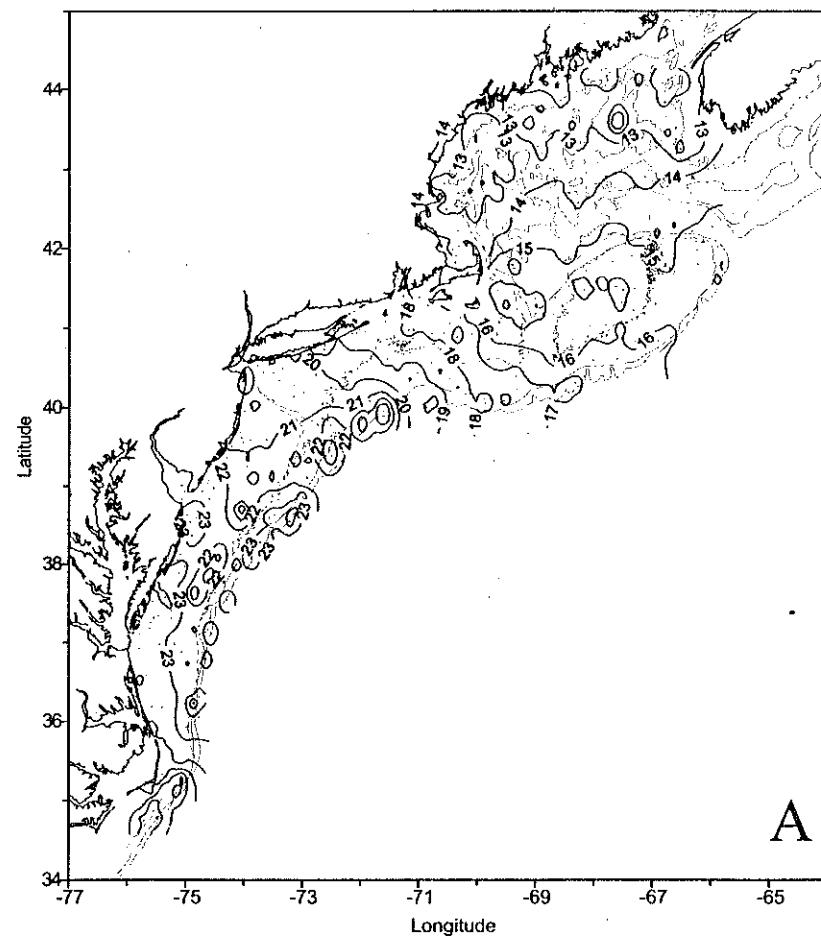


Figure 36. Surface (A) and bottom (B) temperature distributions for the Fall Bottom Trawl - ALB0006.

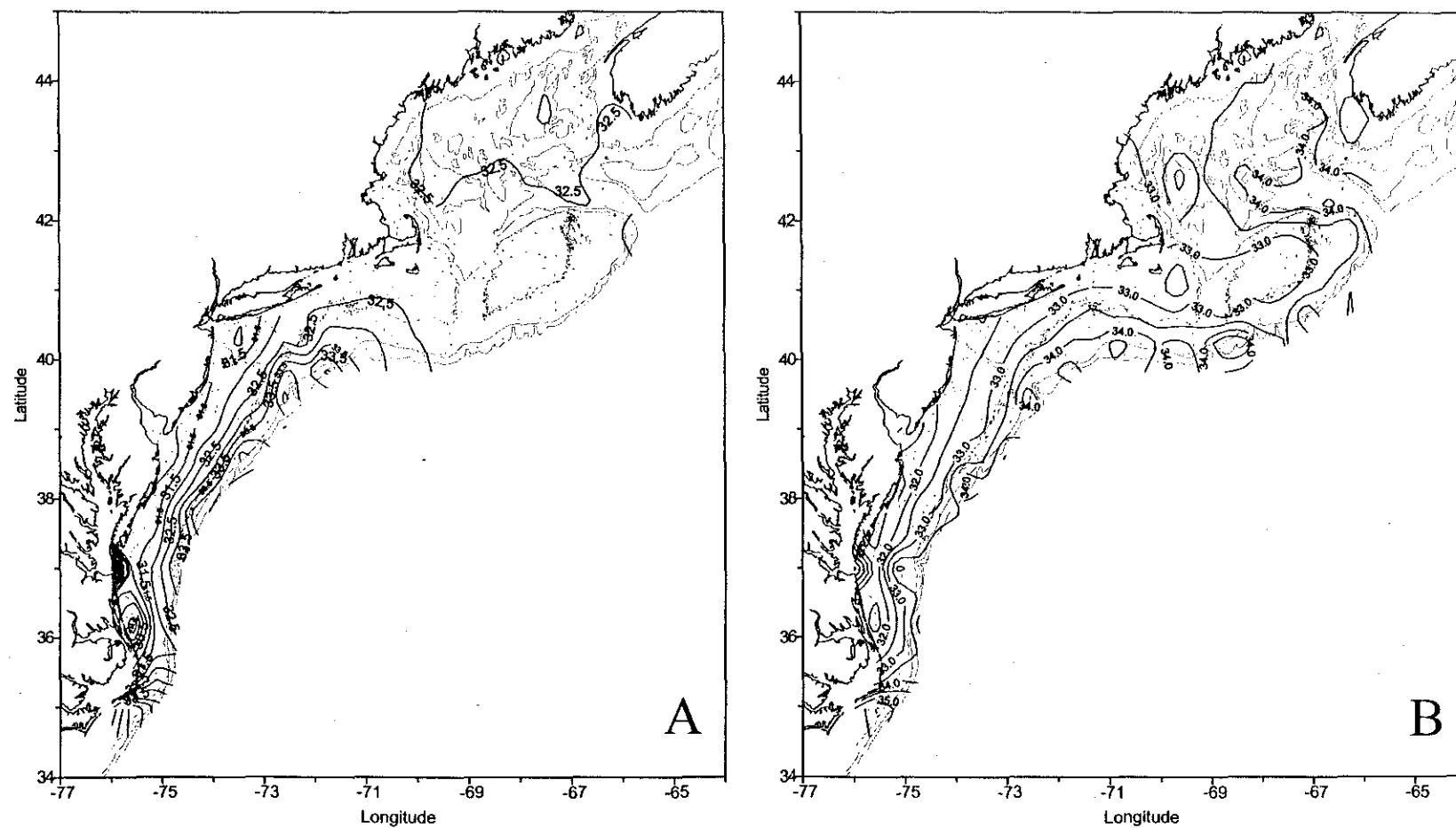


Figure 37. Surface (A) and bottom (B) salinity distributions for the Fall Bottom Trawl - ALB0006.

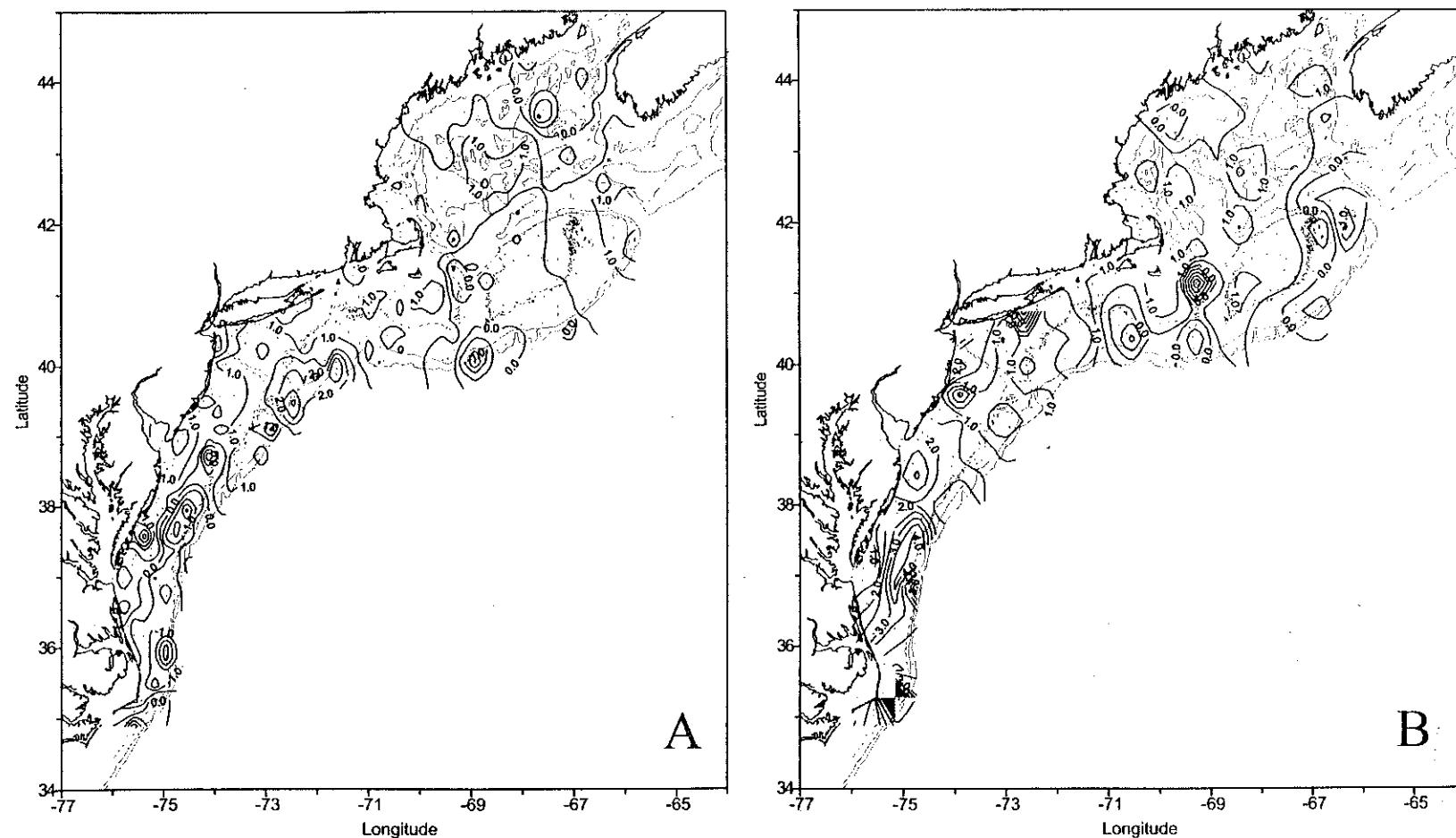


Figure 38. Surface (A) and bottom (B) temperature anomaly distributions for the Fall Bottom Trawl - ALB0006.

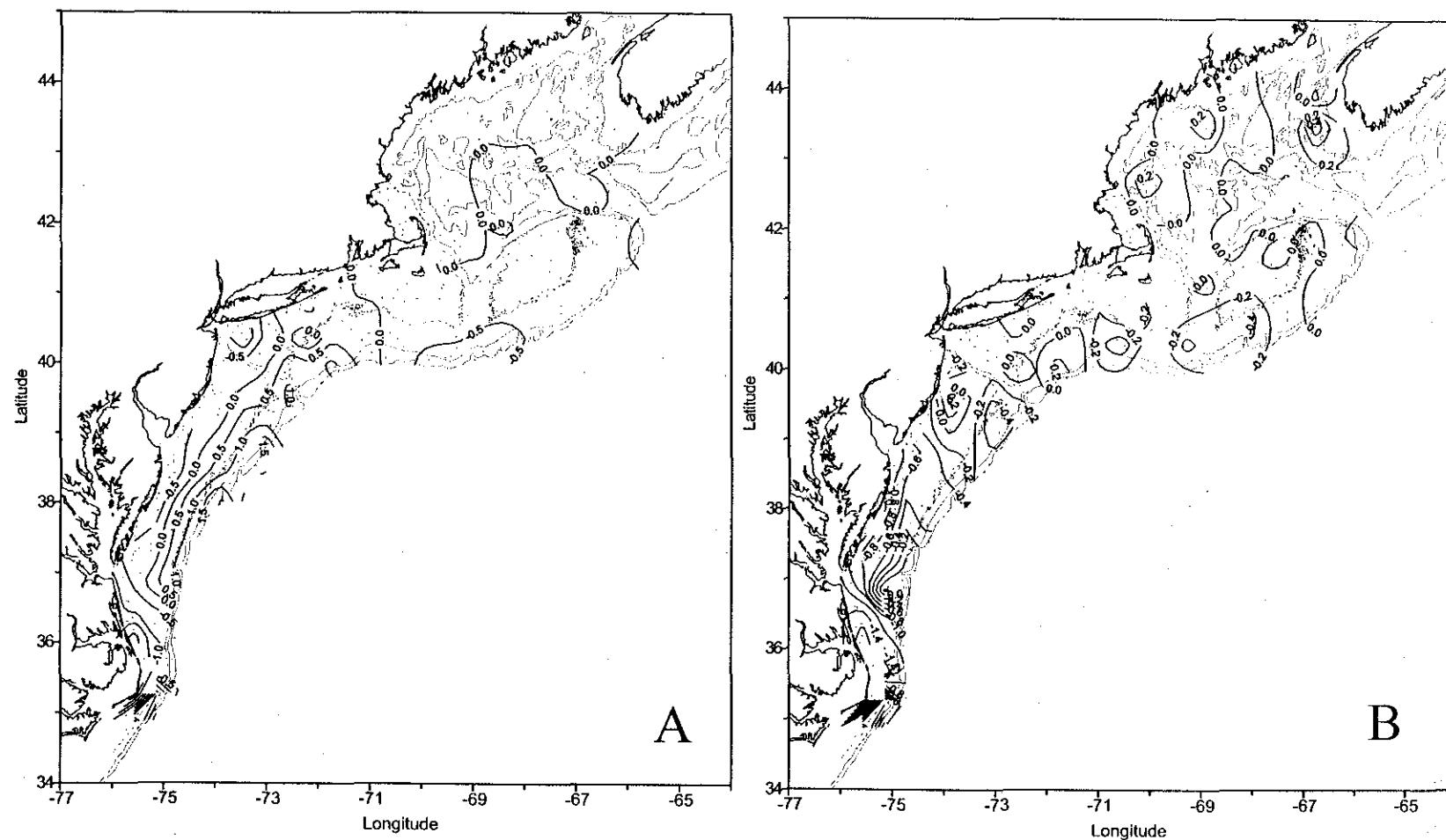


Figure 39. Surface (A) and bottom (B) salinity anomaly distributions for the Fall Bottom Trawl - ALB0006.

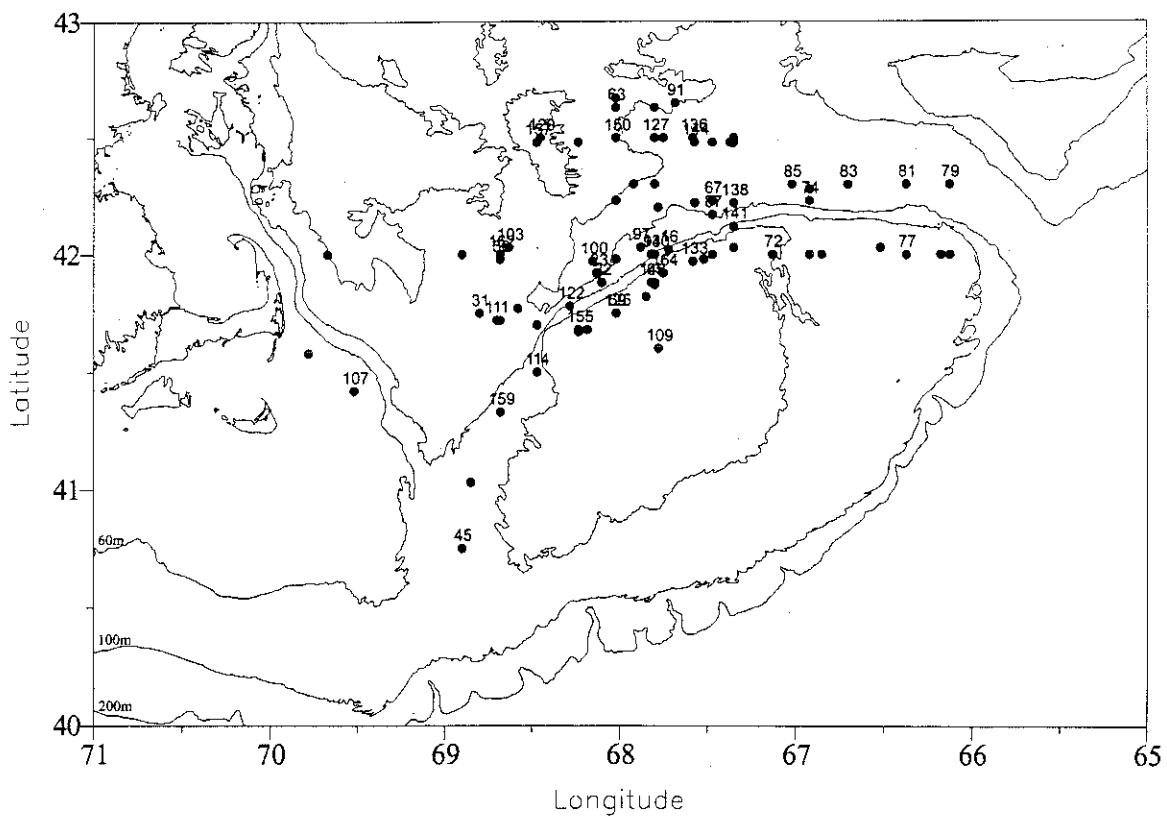


Figure 40. Hydrographic stations occupied during the HydroAcoustic survey  
DEL0008.

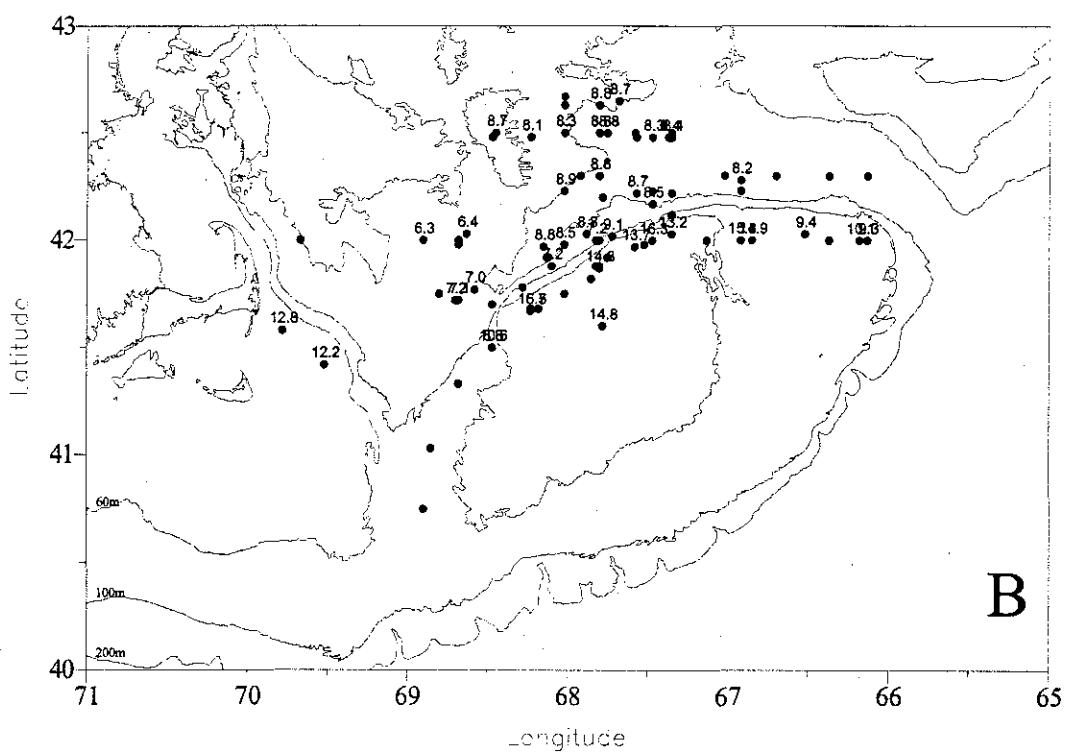
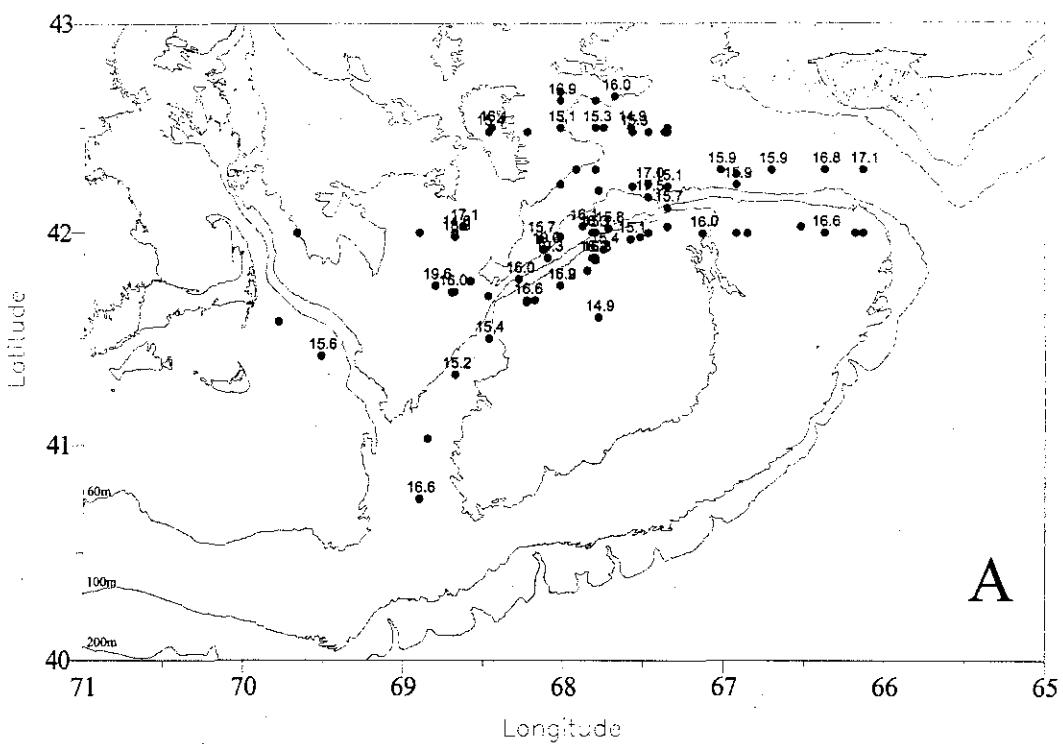


Figure 41. Surface (A) and bottom (B) temperature distributions for the Hydro-Acoustic survey DEL0008.

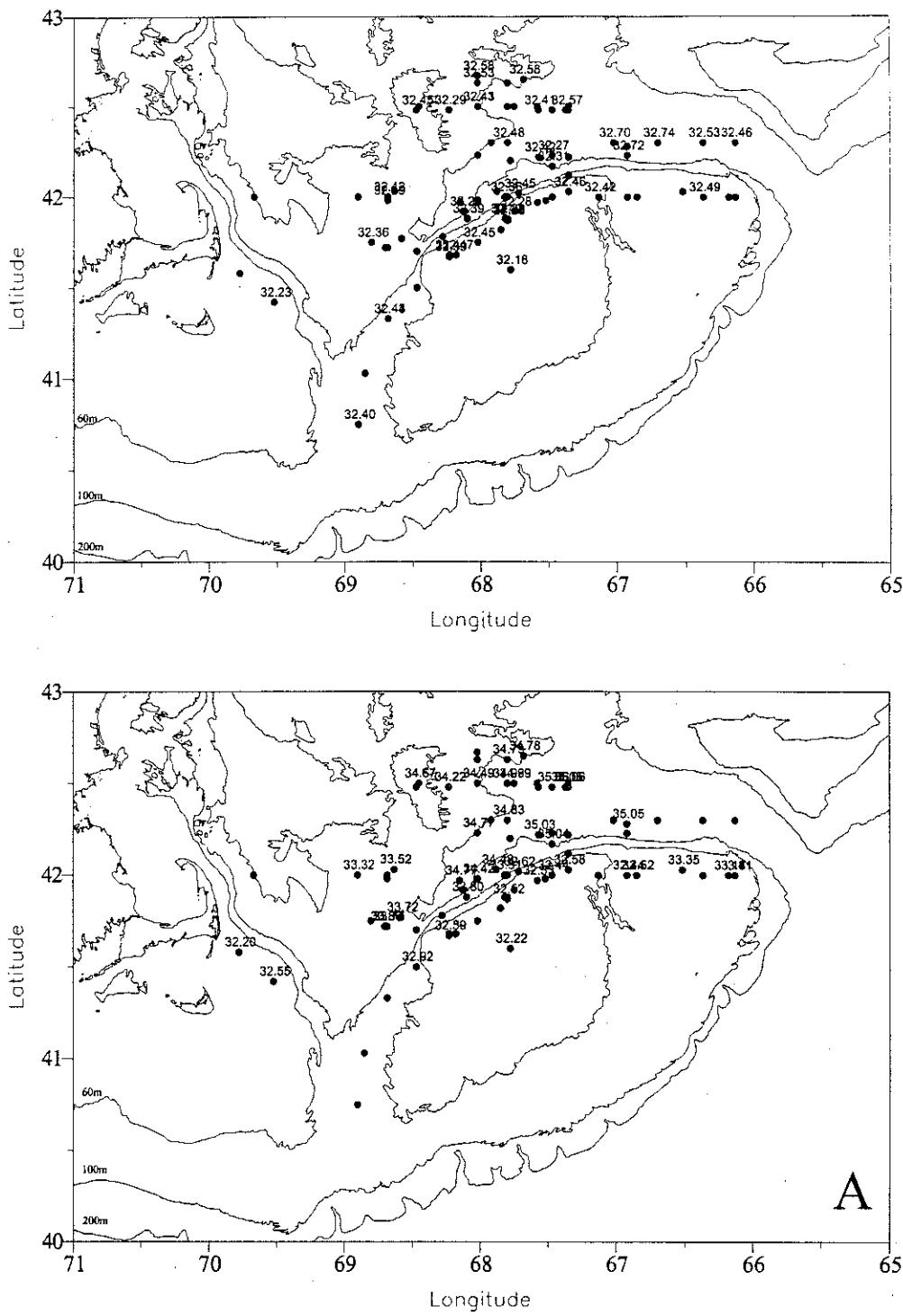


Figure 42. Surface (A) and bottom (B) salinity distributions for the Hydro-Acoustic survey DEL0008.

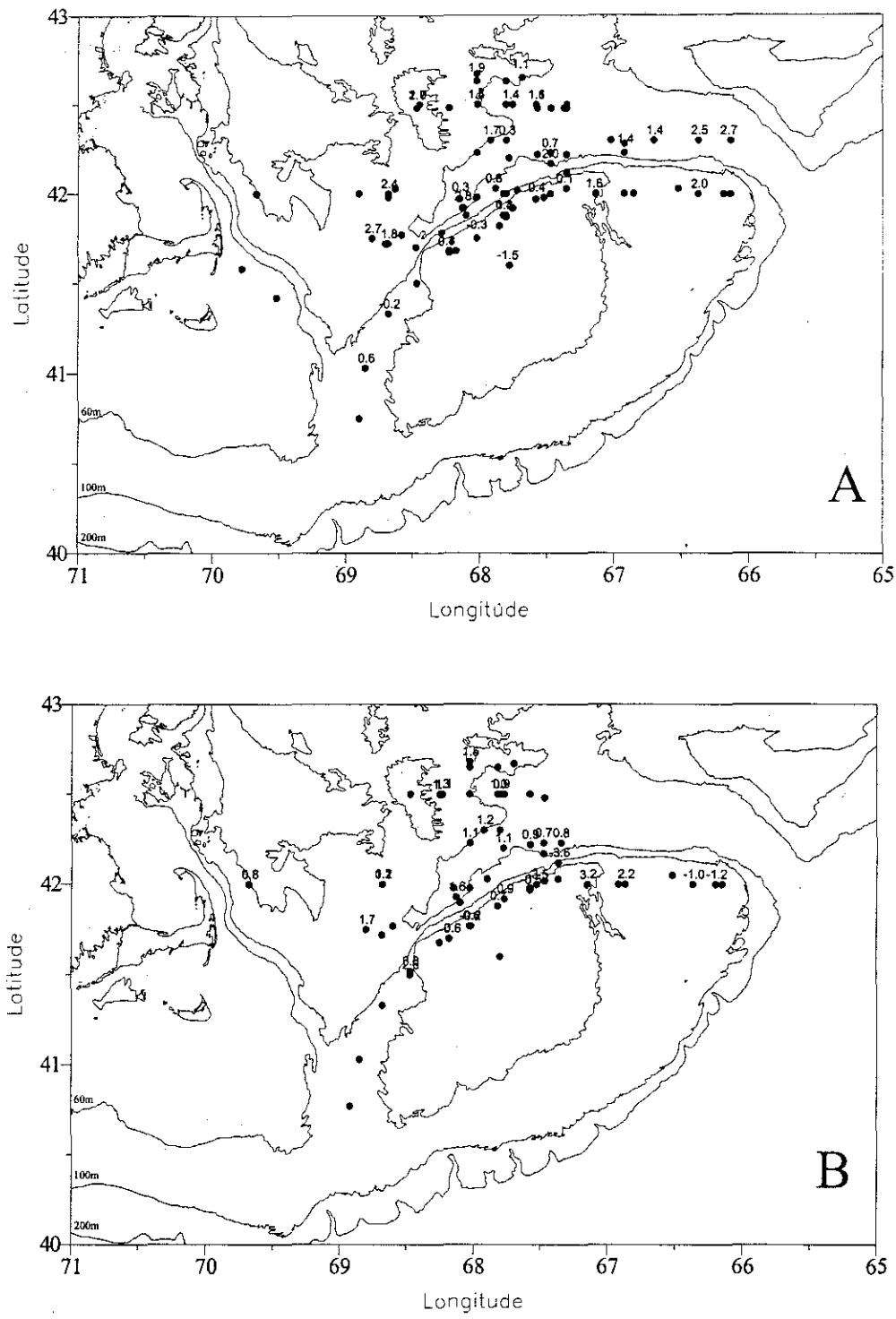


Figure 43. Surface (A) and bottom (B) temperature anomaly distributions for the HydroAcoustic survey DEL0008.

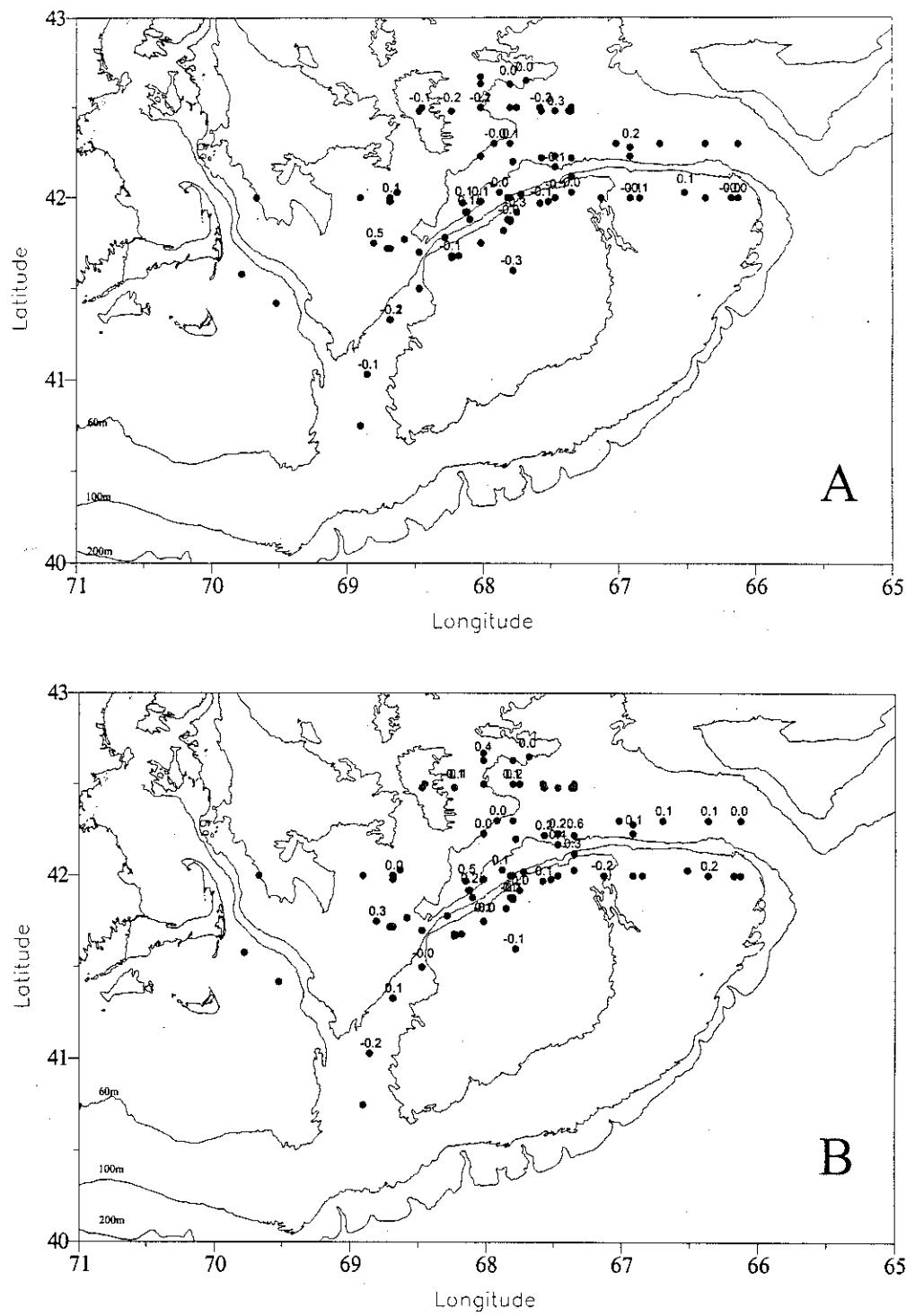


Figure 44. Surface (A) and bottom (B) salinity anomaly distributions for the HydroAcoustic survey DEL0008.

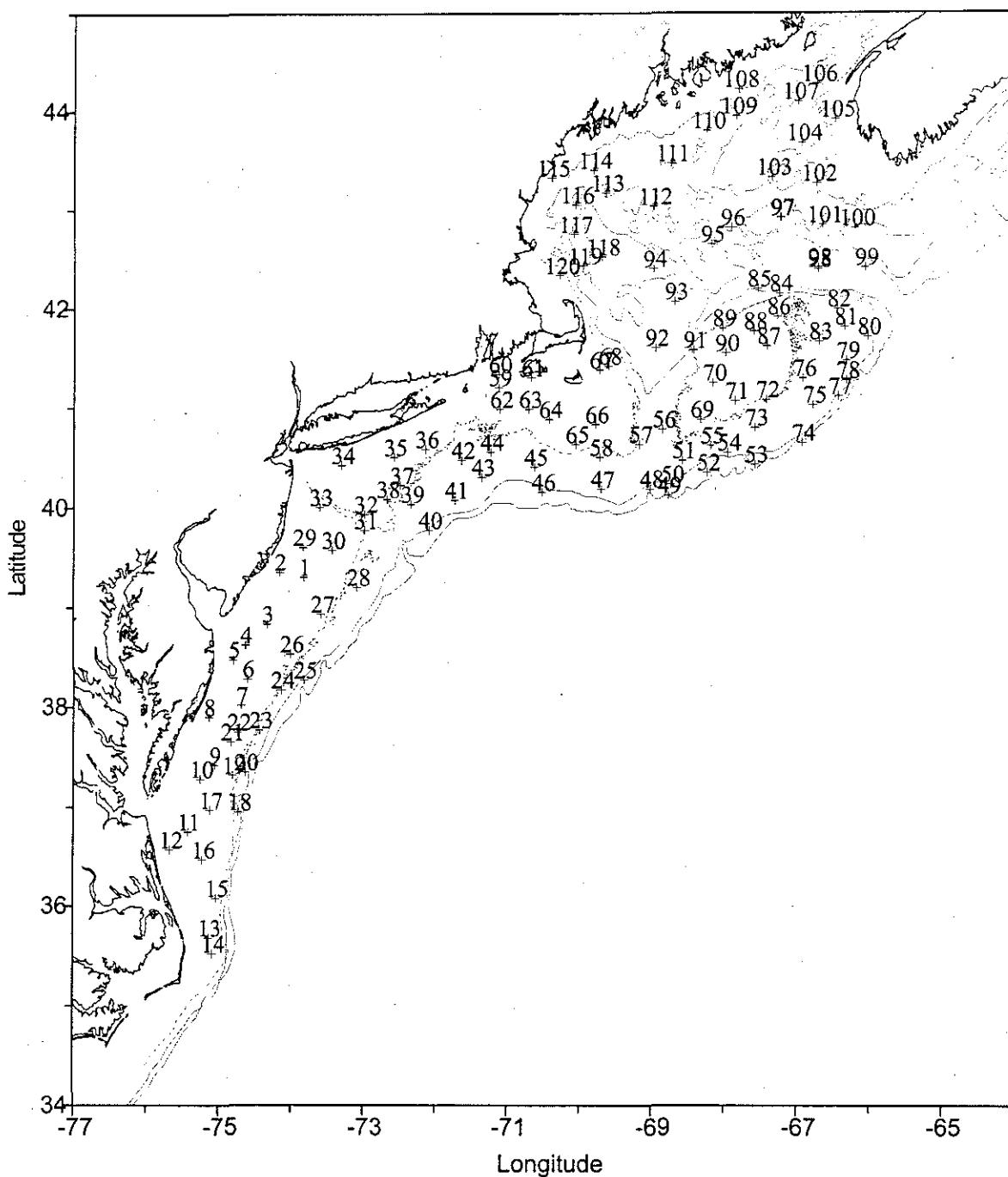
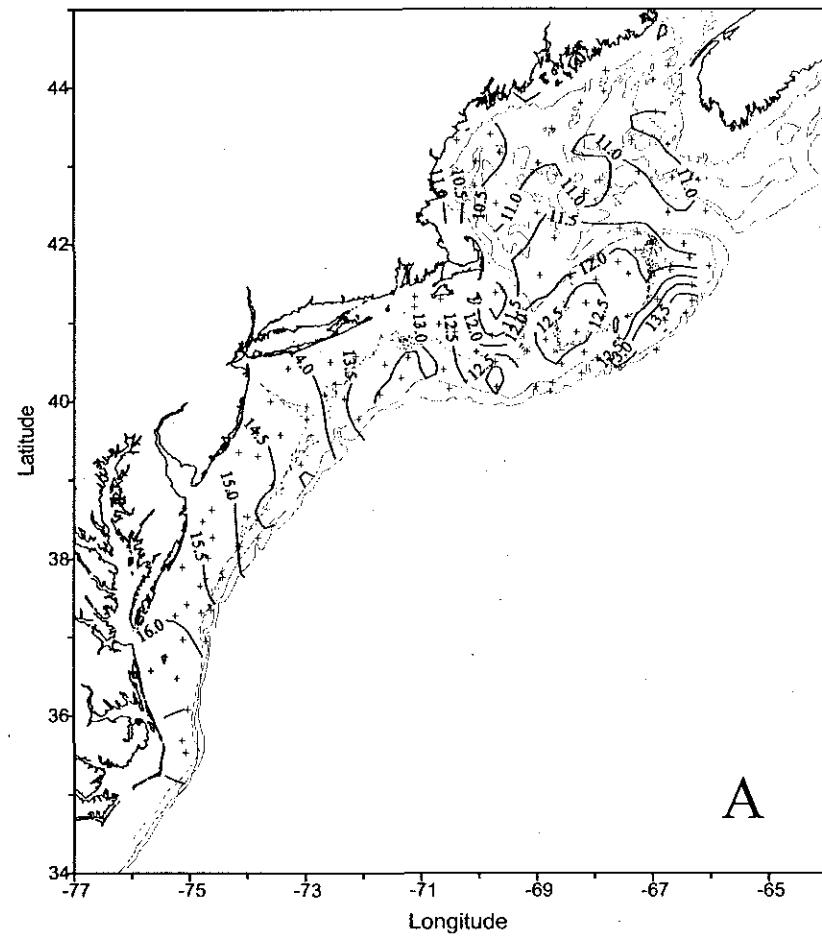
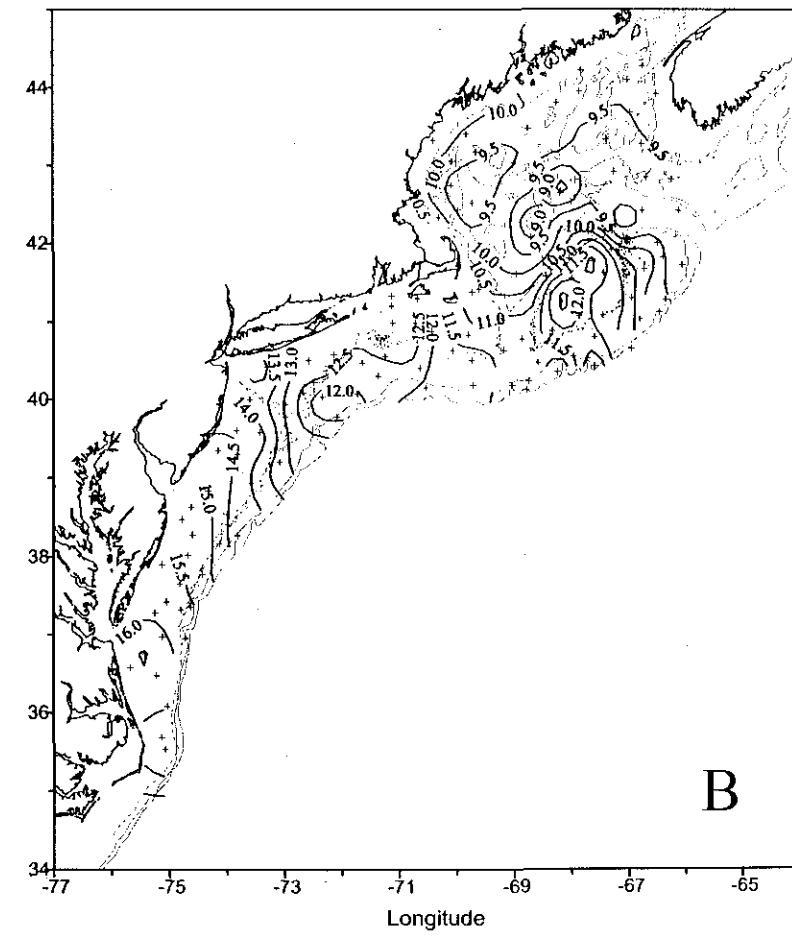


Figure 45. Hydrographic stations occupied during the ECOMON survey - ALB0007.

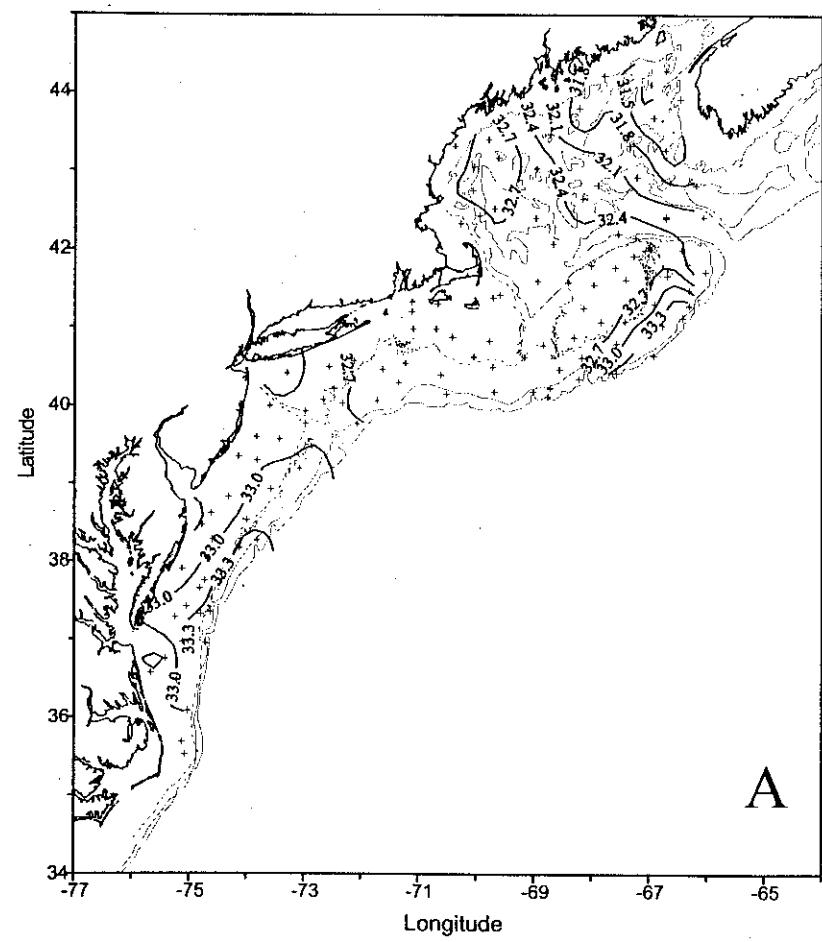


A

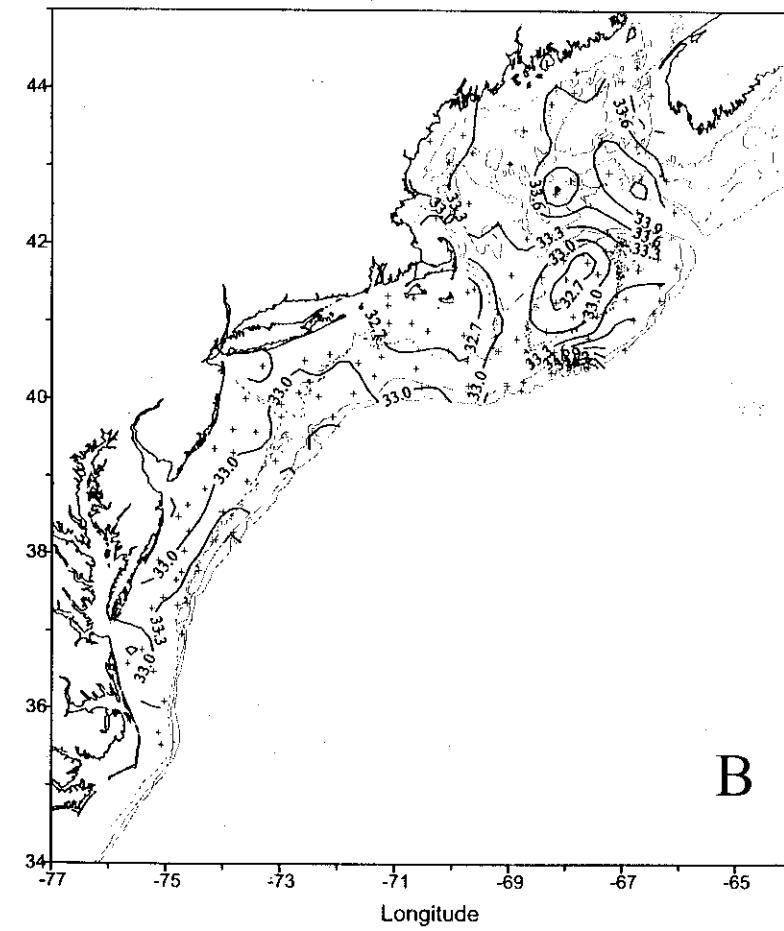


B

Figure 46. Surface (A) and bottom (B) temperature distributions for the ECOMON survey - ALB0007.

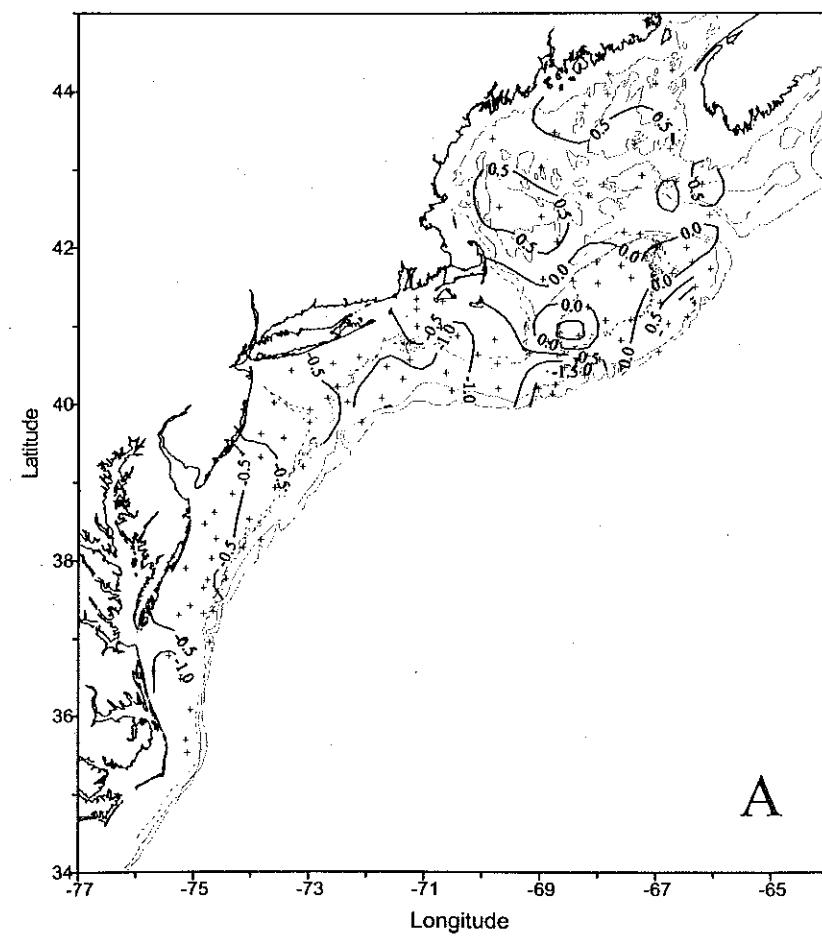


A

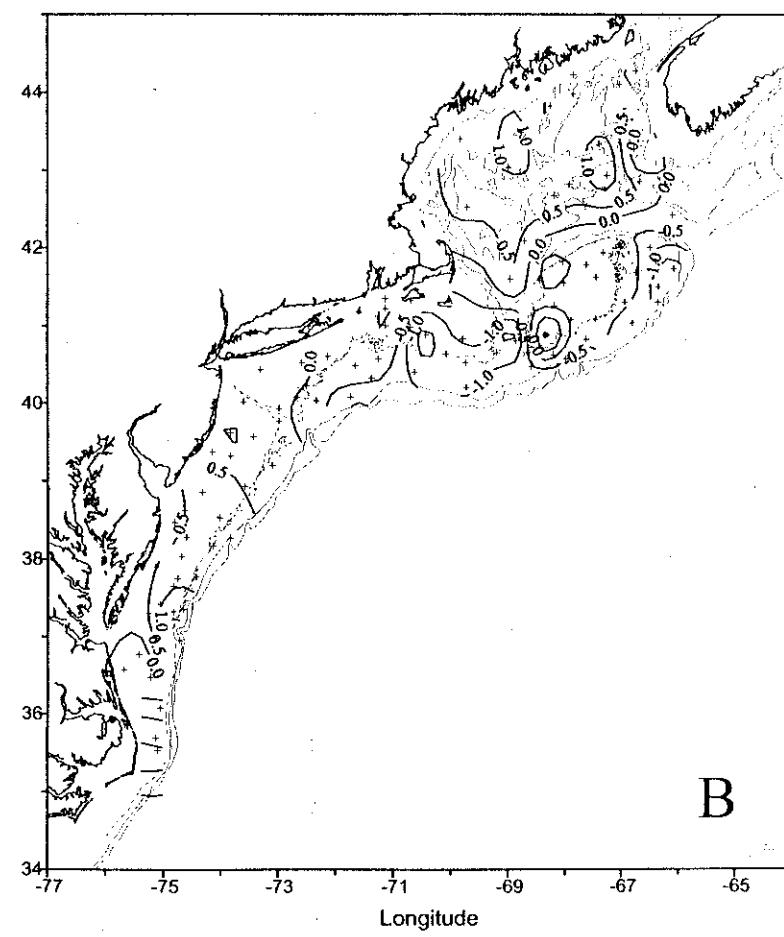


B

Figure 47. Surface (A) and bottom (B) salinity distributions for the ECOMON survey - ALB0007.



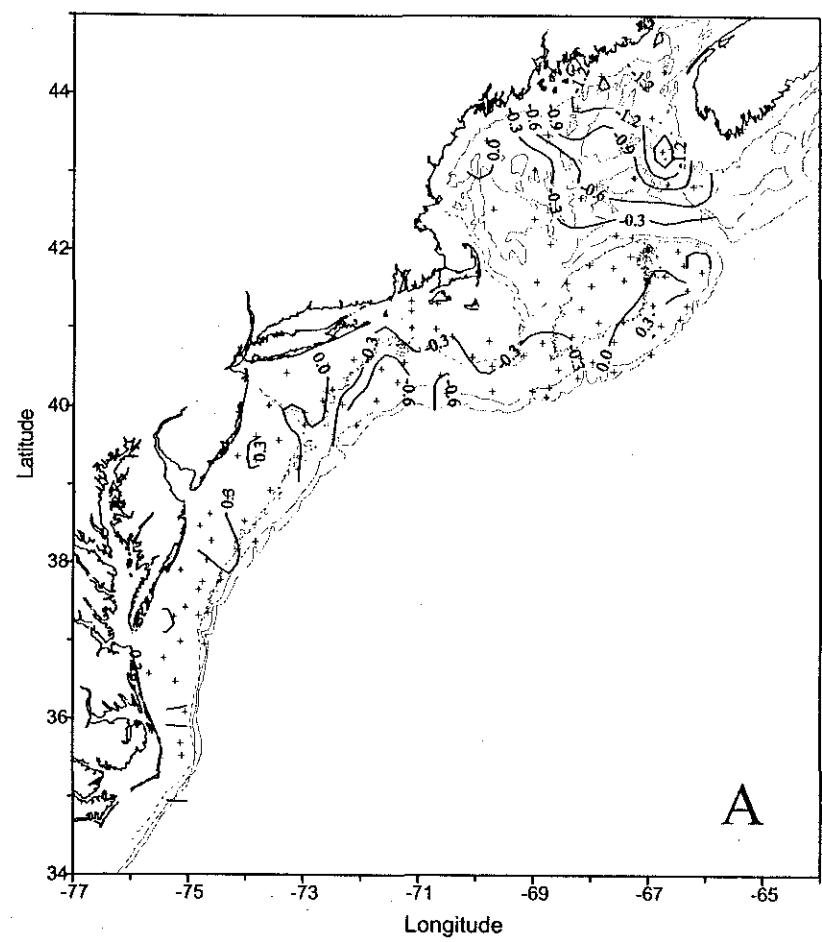
A



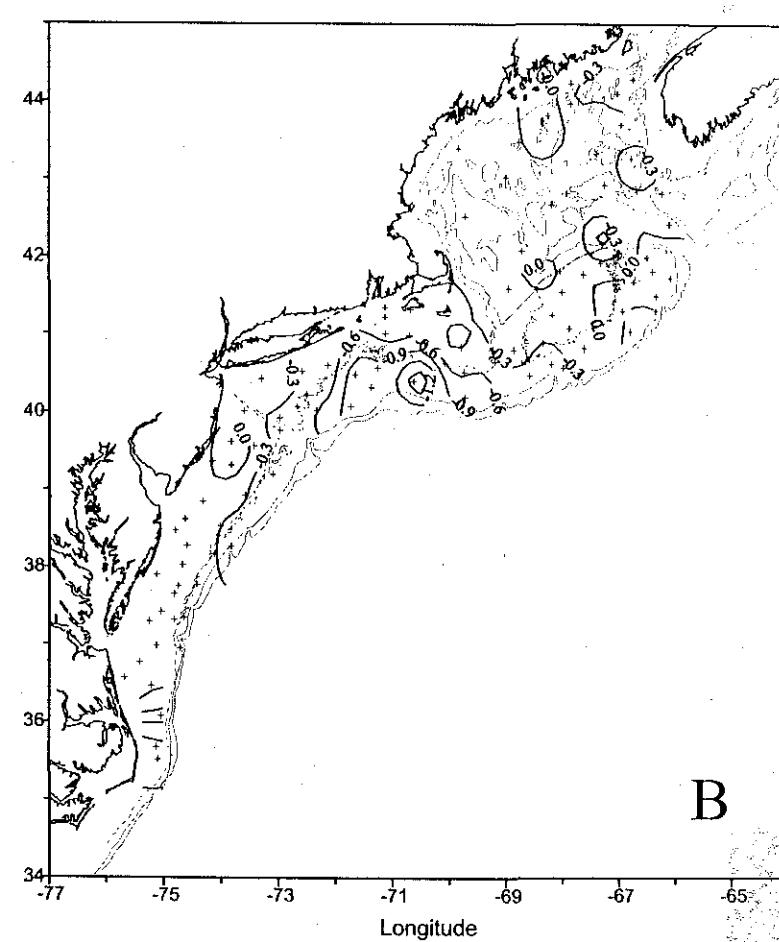
B

59

Figure 48. Surface (A) and bottom (B) temperature anomaly distributions for the ECOMON survey - ALB0007.



A



B

09

Figure 49. Surface (A) and bottom (B) salinity anomaly distributions for the ECOMON survey - ALB0007.

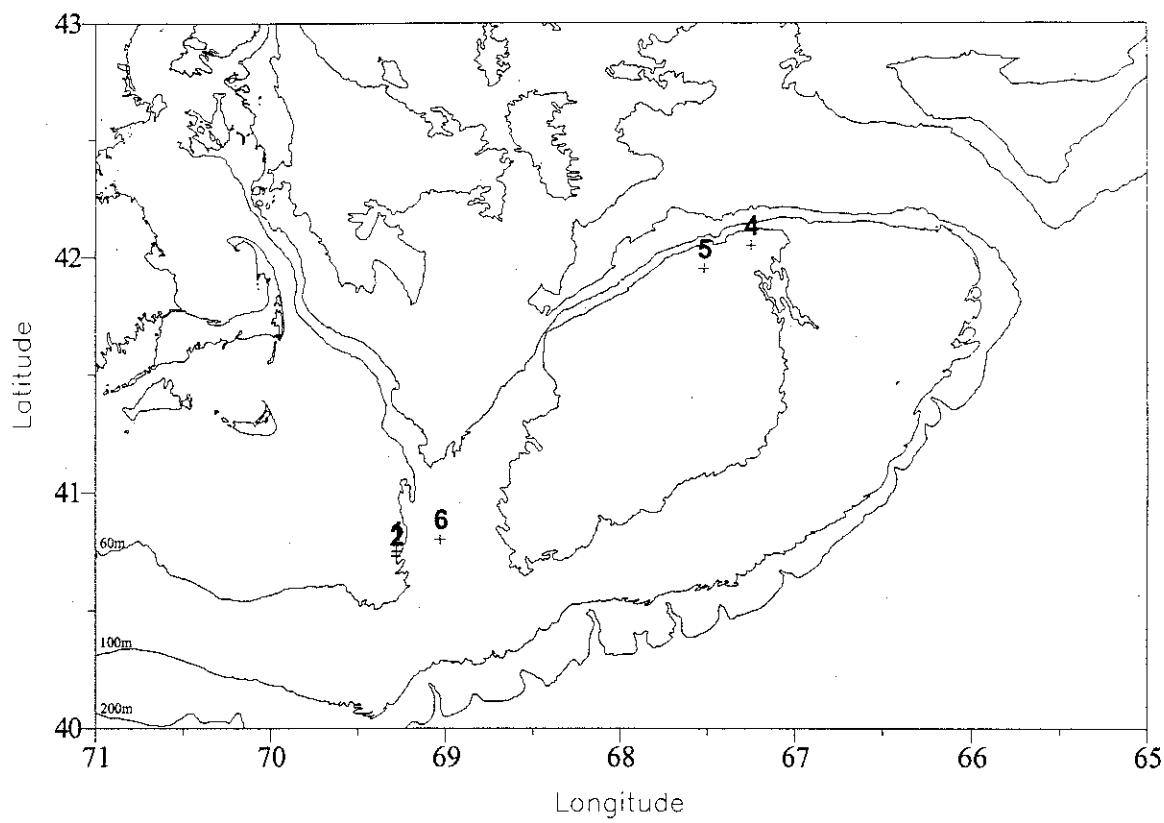


Figure 50. CTD stations occupied during the Benthic Habitat cruise DEL0010.

Appendix A. Summary of cruise information and hydrographic work completed.

## Winter Bottom Trawl Survey

**Cruise:** ALB0001  
**Vessel:** R/V Albatross IV  
**Dates:** 10 – 29 February  
**Sea Days:** 20  
**Instrument(s):** 1495, 2277  
**Total # of stations:** 129  
**# of vertical CTD/Profiler casts:** 84  
**# of double oblique Profiler casts:** 45  
**# Salinity samples:** 22  
**Salt correction:** 1495=+0.012; 2277=+0.009

**Cruise Objectives:** To (1) determine the winter distribution and relative abundance of fish and selected invertebrate species; (2) collect biological samples for studies of age and growth relationships, fecundity, maturity, and food habits; (3) collect hydrographic and meteorological data; (4) collect samples of ichthyoplankton and zooplankton; (5) make data and sample collections for cooperative researchers and programs.

## Spring Bottom Trawl Survey

**Cruise:** ALB0002  
**Vessel:** R/V Albatross IV  
**Dates:** 16 March – 8 May  
**Sea Days:** 53  
**Instrument(s):** 2277  
**Total # of stations:** 338  
**# of vertical CTD/Profiler casts:** 217  
**# of double oblique Profiler casts:** 121  
**# Salinity samples:** 42  
**Salt correction:** +0.007

**Cruise Objectives:** To (1) determine the spring distribution and relative abundance of fish and invertebrate species; (2) collect biological samples for studies of age and growth relationships, fecundity, maturity, and food habits; (3) collect hydrographic and meteorological data; (4) make collections of data and samples for cooperative researchers and programs.

## Ecosystem Monitoring

**Cruise:** DEL0006  
**Vessel:** R/V Delaware II  
**Dates:** 23 May – 8 June  
**Sea Days:** 16  
**Instrument(s):** 2879, 0851, 0456  
**Total # of stations:** 168  
**# of vertical CTD/Profiler casts:** 30  
**# of double oblique Profiler casts:** 168  
**# Salinity samples:** 30  
**Salt correction:** +0.006, +0.007, +0.010

**Cruise Objectives:** To assess the impact of changing biological and physical properties of the Northeast Continental Shelf ecosystem which influence the sustainable productivity of the living marine resources.

## Benthic Habitat Study

**Cruise:** ALB0003  
**Vessel:** R/V Albatross IV  
**Dates:** 20 – 28 June  
**Sea Days:** 8  
**Instrument(s):** 2277  
**Total # of stations:** 39  
**# of vertical CTD/Profiler casts:** 10  
**# of double oblique Profiler casts:** 0  
**# Salinity samples:** 10  
**Salt correction:** No correction due to sample mislabeling

**Cruise Objectives:** To monitor the recovery of the benthic habitat in the closed areas.

## Scallop Survey

**Cruise:** ALB0004  
**Vessel:** R/V Albatross IV  
**Dates:** 7 July – 17 August  
**Sea Days:** 43  
**Instrument(s):** 1496, 2277  
**Total # of stations:** 111 (hydrographic stations)  
**# of vertical CTD/Profiler casts:** 111  
**# of double oblique Profiler casts:** 0  
**# Salinity samples:** 28  
**Salt correction:** +0.002, +0.0001

**Cruise Objectives:** To (1) determine the distribution and relative abundance of the sea scallop *Placopecten magellanicus* and Iceland scallop *Chlamys islandica*; (2) collect biological samples and data relative to assessment needs; (3) monitor hydrographic and meteorological conditions; and (4) make collections for interested scientists at other institutions and laboratories.

## Marine Mammal Survey

**Cruise:** DEL0007  
**Vessel:** R/V Delaware II  
**Dates:** 9 July – 28 August  
**Sea Days:** 50  
**Instrument(s):** 1447, 1468  
**Total # of stations:** 189 (hydrographic stations)  
**# of vertical CTD/Profiler casts:** 189  
**# of double oblique Profiler casts:** 0  
**# Salinity samples:** 0  
**Salt correction:** No Salts Taken

**Cruise Objectives:** To conduct satellite, VHF, and time-depth-recorder (TDR) tagging of northern right whales, and to conduct oceanographic sampling in association with mammal observations.

## Ecosystem Monitoring

**Cruise:** ALB0005  
**Vessel:** R/V Albatross IV  
**Dates:** 23 – 29 August  
**Sea Days:** 7  
**Instrument(s):** 1496  
**Total # of stations:** 72  
**# of vertical CTD/Profiler casts:** 0  
**# of double oblique Profiler casts:** 72  
**# Salinity samples:** 10  
**Salt correction:** +0.004

**Cruise Objectives:** To assess the impact of changing biological and physical properties of the Northeast Continental Shelf ecosystem which influence the sustainable productivity of the living marine resources.

## Fall Bottom Trawl Survey

**Cruise:** ALB0006  
**Vessel:** R/V Albatross IV  
**Dates:** 6 September – 20 October  
**Sea Days:** 44  
**Instrument(s):** 1496  
**Total # of stations:** 340  
**# of vertical CTD/Profiler casts:** 218  
**# of double oblique Profiler casts:** 122  
**# Salinity samples:** 48  
**Salt correction:** +0.007

**Cruise Objectives:** To (1) determine the autumn distribution and relative abundance of fish and invertebrate species; (2) collect biological samples for studies of age and growth relationships, fecundity, maturity and food habits; (3) collect hydrographic and meteorological data; (4) make collections of data and samples for cooperative researchers and programs.

## Hydro-Acoustic Survey

**Cruise:** DEL0008  
**Vessel:** R/V Delaware II  
**Dates:** 13 September – 7 October  
**Sea Days:** 22  
**Instrument(s):** 0851  
**Total # of stations:** 104 (hydrographic stations)  
**# of vertical CTD/Profiler casts:** 104  
**# of double oblique Profiler casts:** 0  
**# Salinity samples:** 5  
**Salt correction:** +0.009

**Cruise Objectives:** The primary goal is to provide fisheries independent abundance estimates of Atlantic herring in the Georges Bank and Gulf of Maine regions, and to calibrate the EK-500 echo-integrator and test the mid-water trawl performance.

## Ecosystem Monitoring

**Cruise:** ALB0007  
**Vessel:** R/V Albatross IV  
**Dates:** 31 October – 15 November  
**Sea Days:** 16  
**Instrument(s):** 2879, 1496  
**Total # of stations:** 120  
**# of vertical CTD/Profiler casts:** 6  
**# of double oblique Profiler casts:** 120  
**# Salinity samples:** 22  
**Salt correction:** +0.008, +0.016

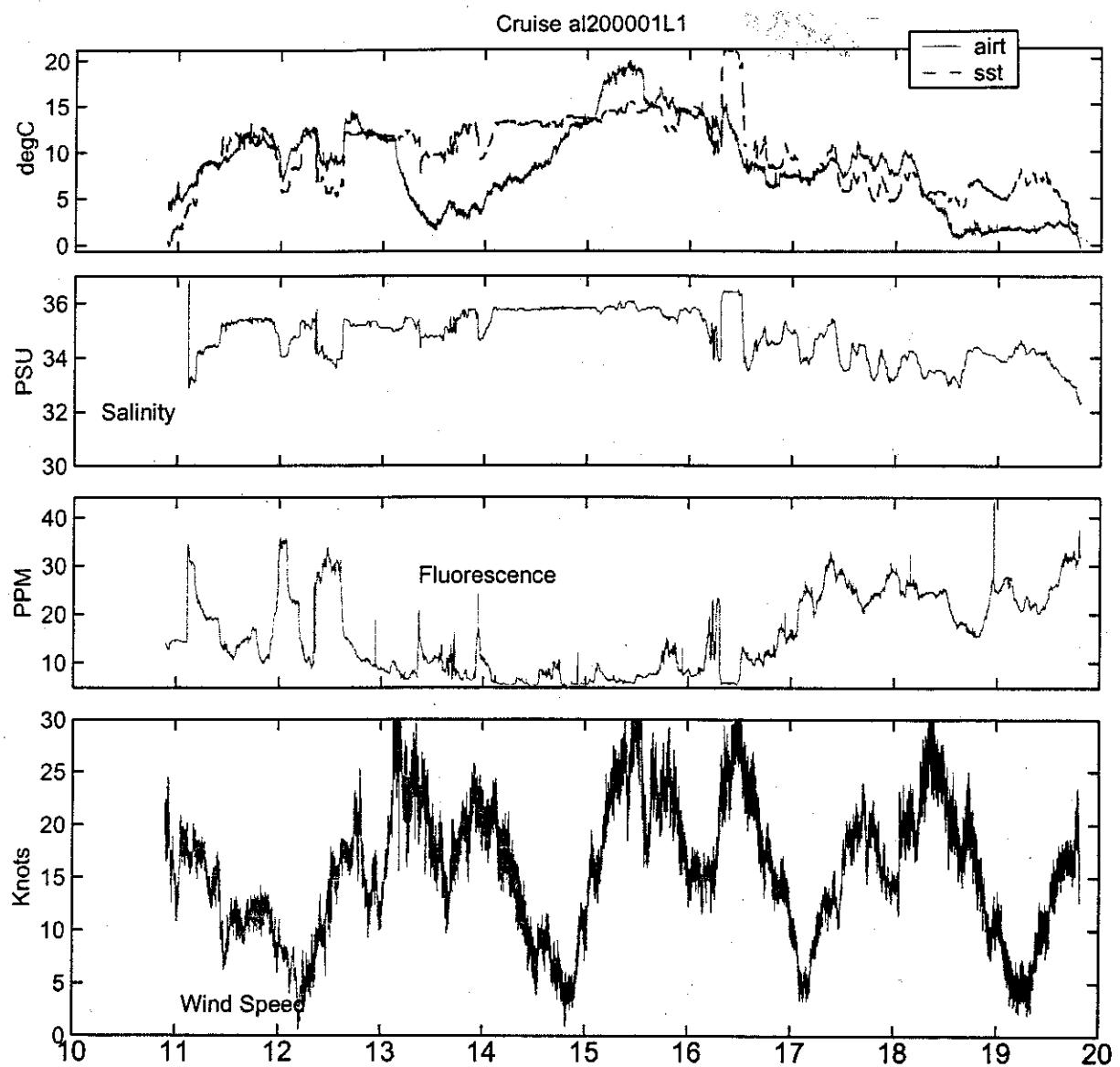
**Cruise Objectives:** To assess the impact of changing biological and physical properties of the Northeast Continental Shelf ecosystem which influence the sustainable productivity of the living marine resources.

## Benthic Habitat Study

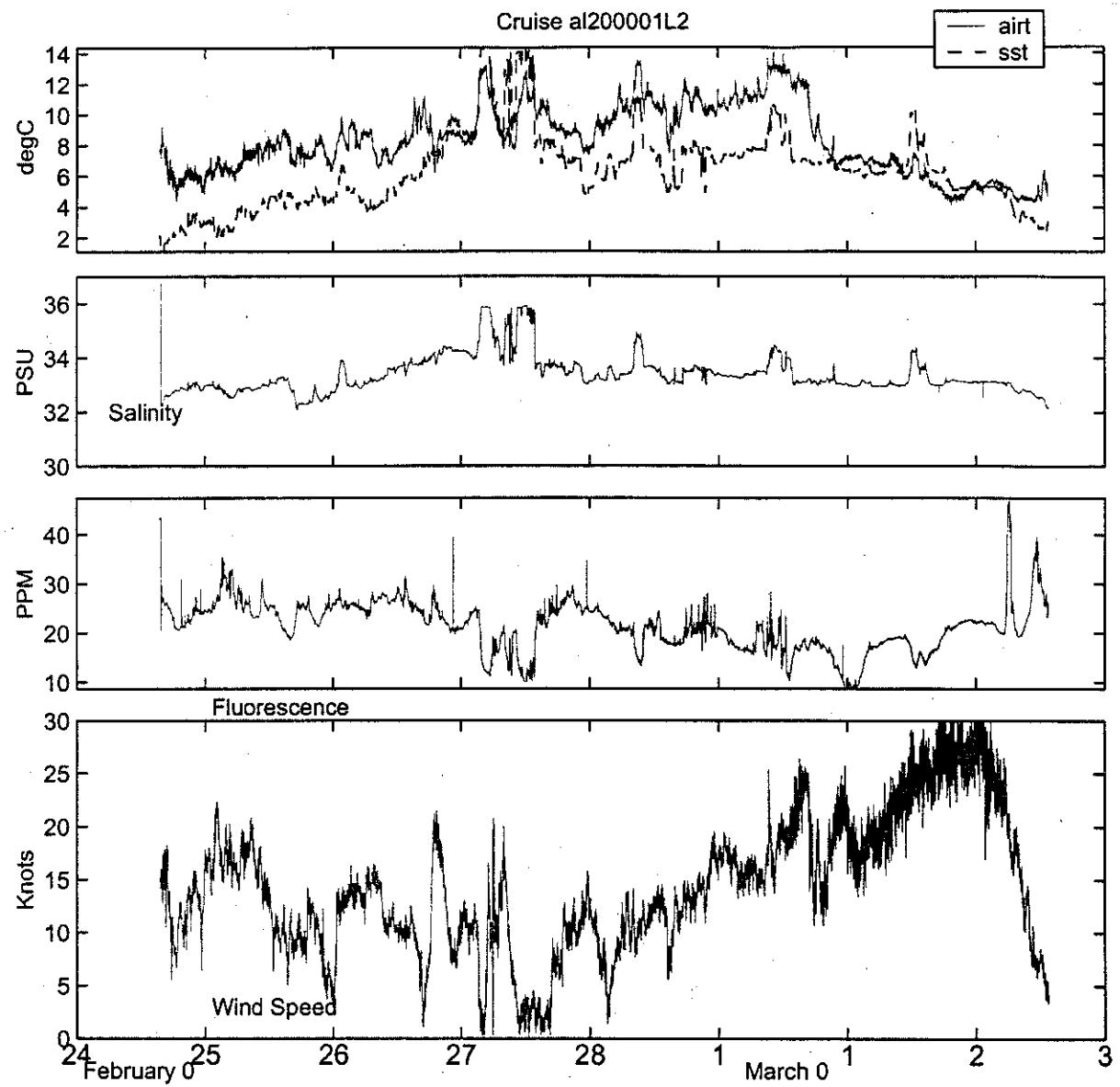
**Cruise:** DEL0010  
**Vessel:** R/V Delaware II  
**Dates:** 3 – 13 November  
**Sea Days:** 11  
**Instrument(s):** 2277  
**Total # of stations:** 5 (hydrographic stations)  
**# of vertical CTD/Profiler casts:** 5  
**# of double oblique Profiler casts:** 0  
**# Salinity samples:** 4  
**Salt correction:** +.023

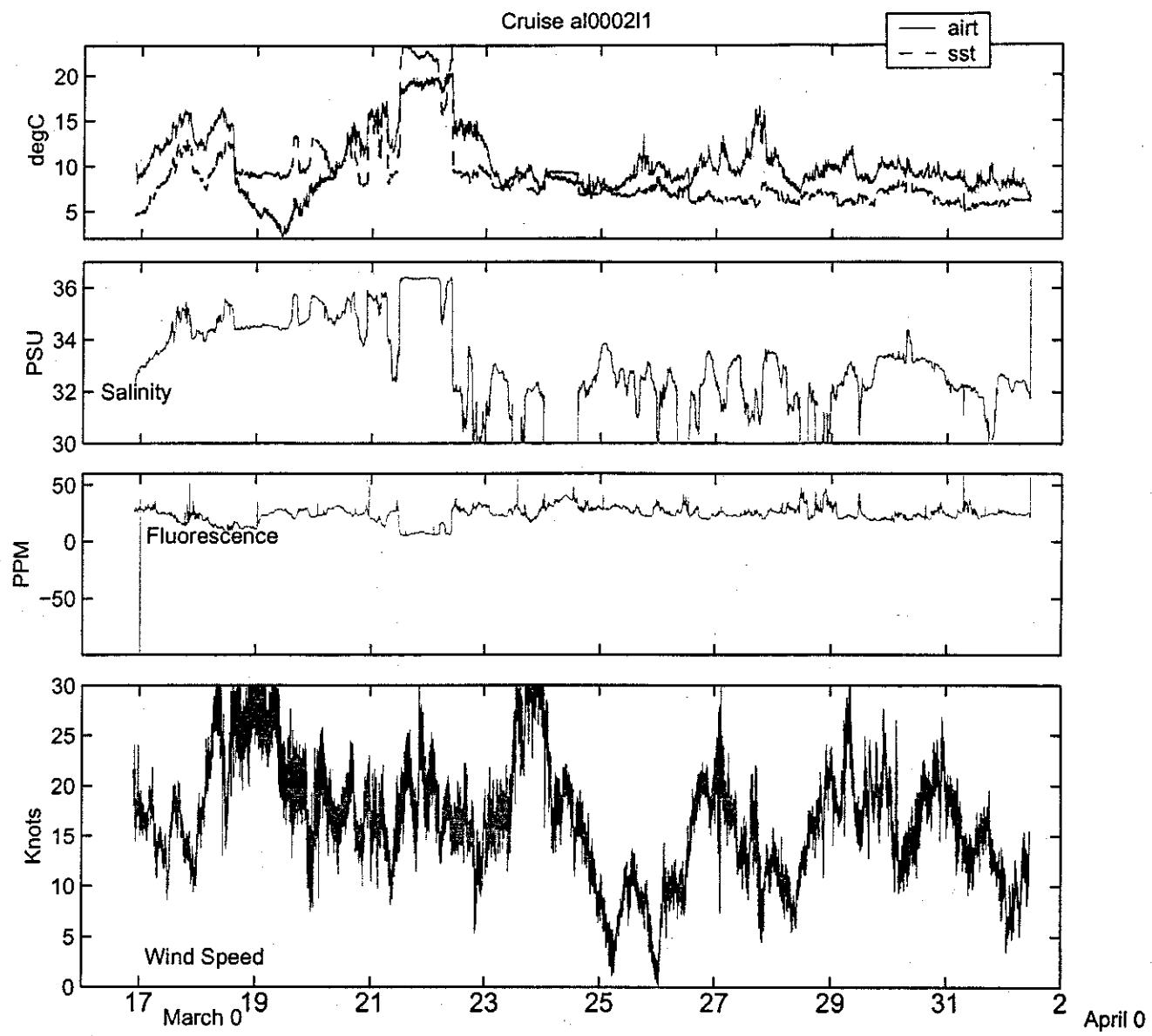
**Cruise Objectives:** To monitor the recovery of the benthic habitat in the closed areas.

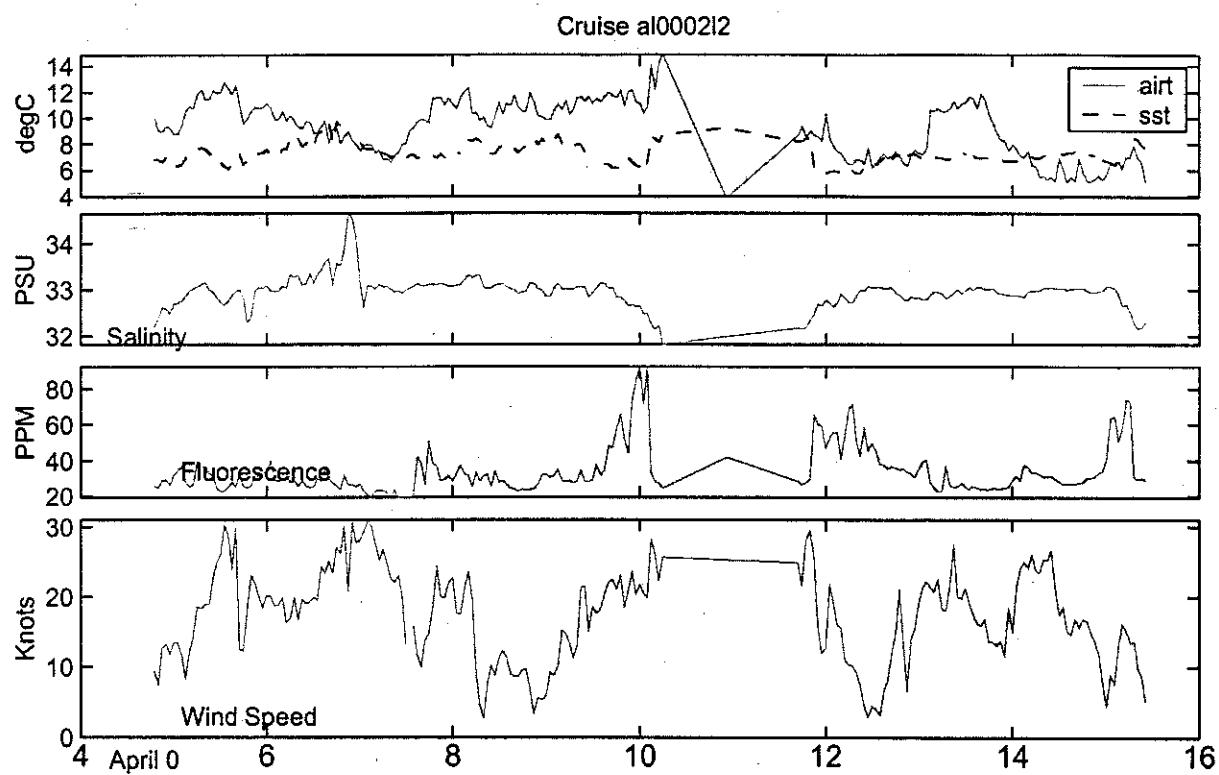
Appendix B. Time series plots of shipboard environmental sensor records.

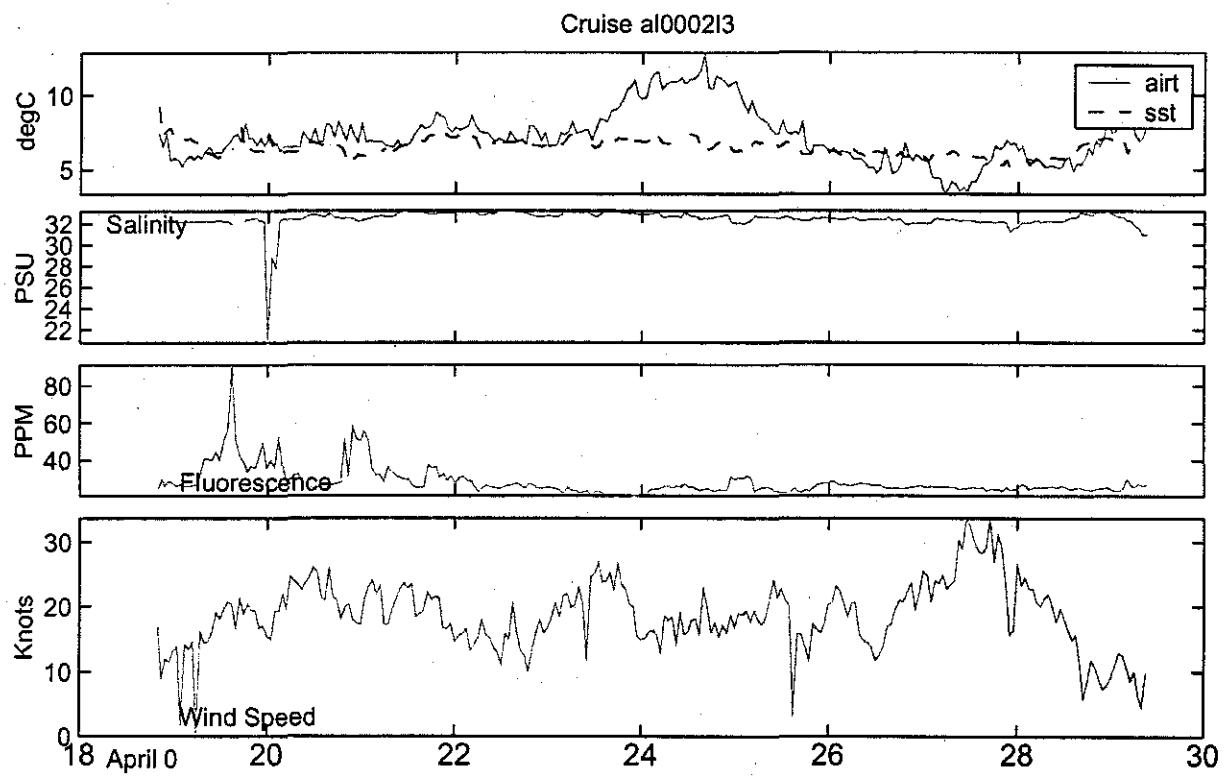


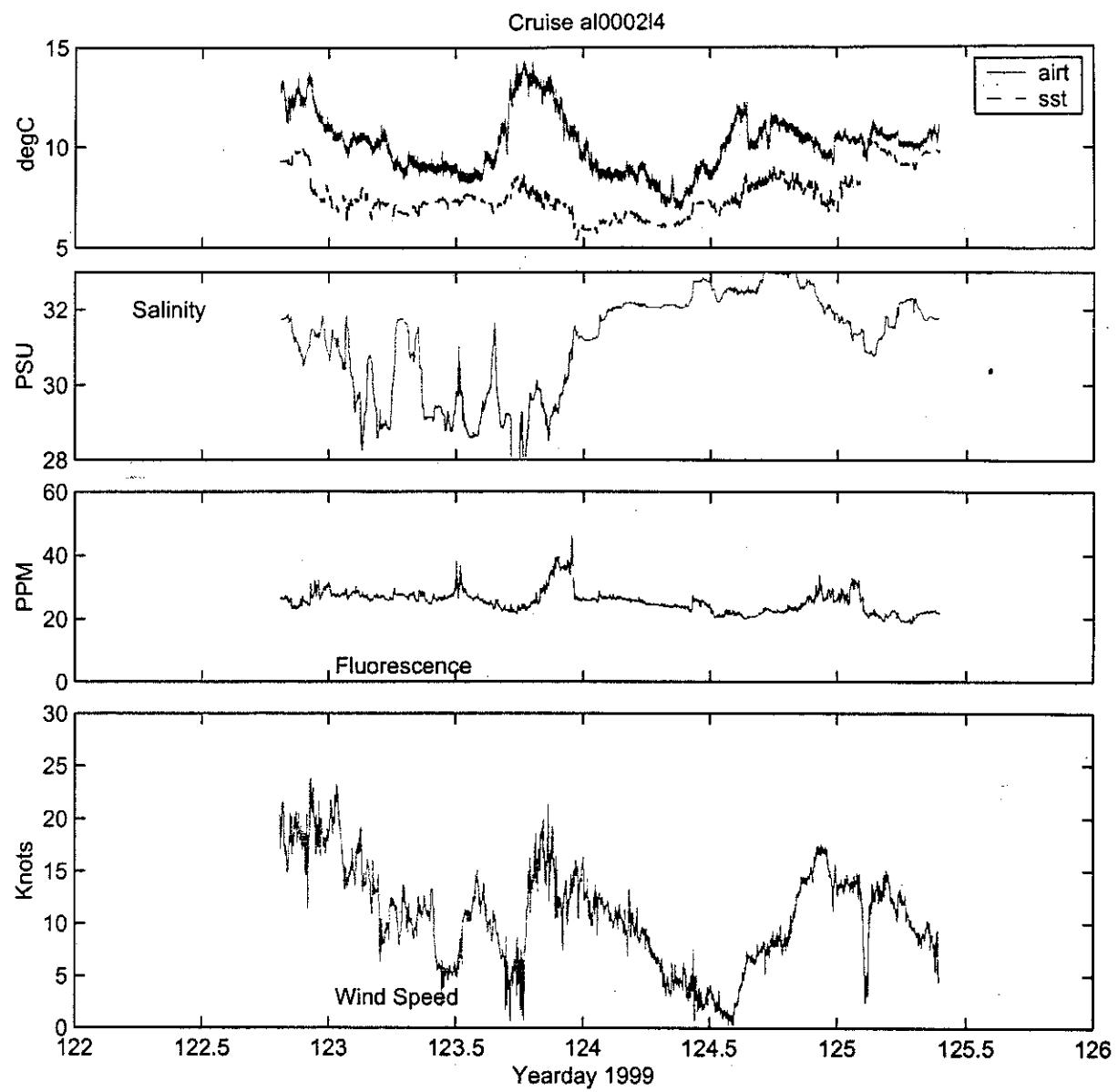
February 2000

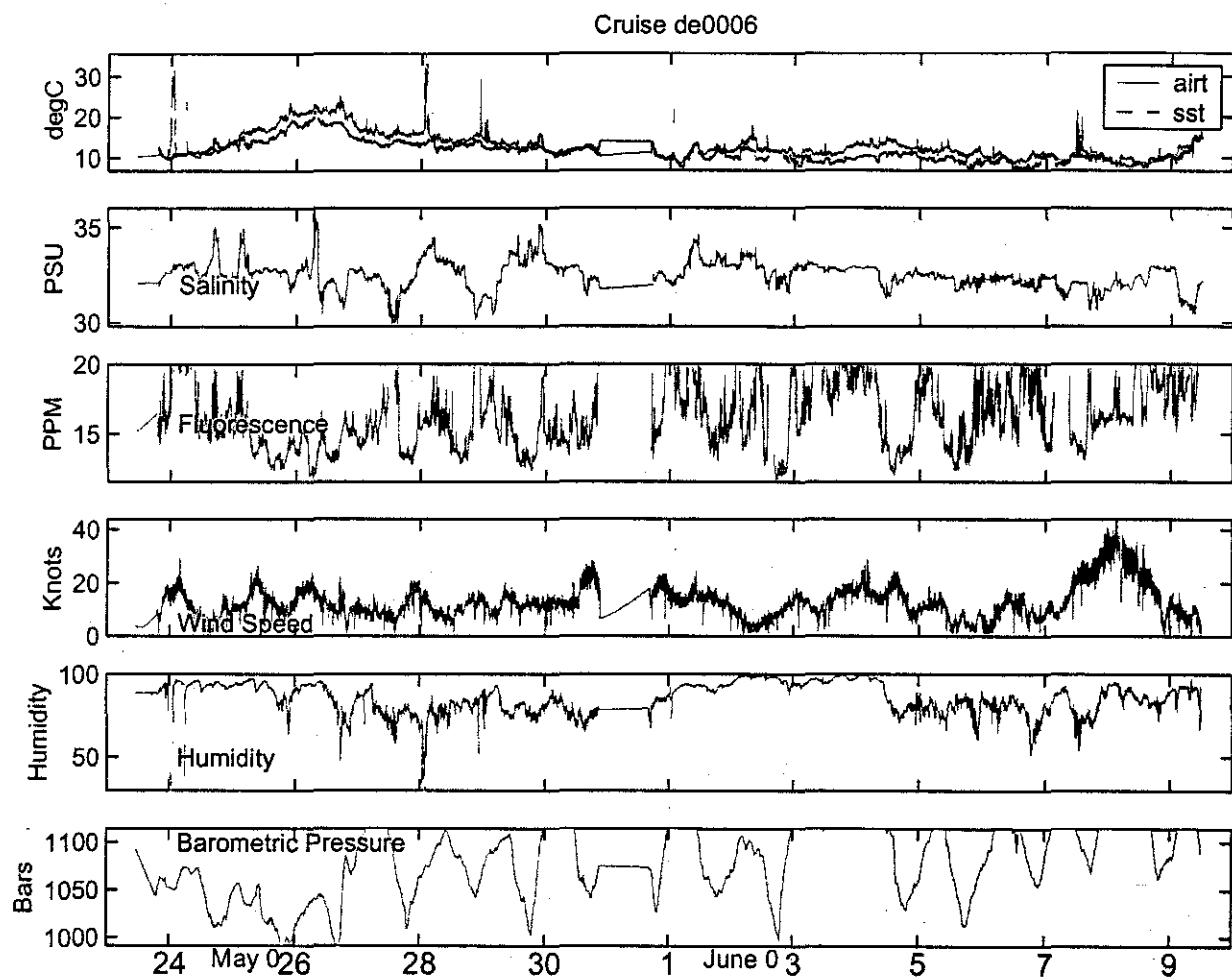


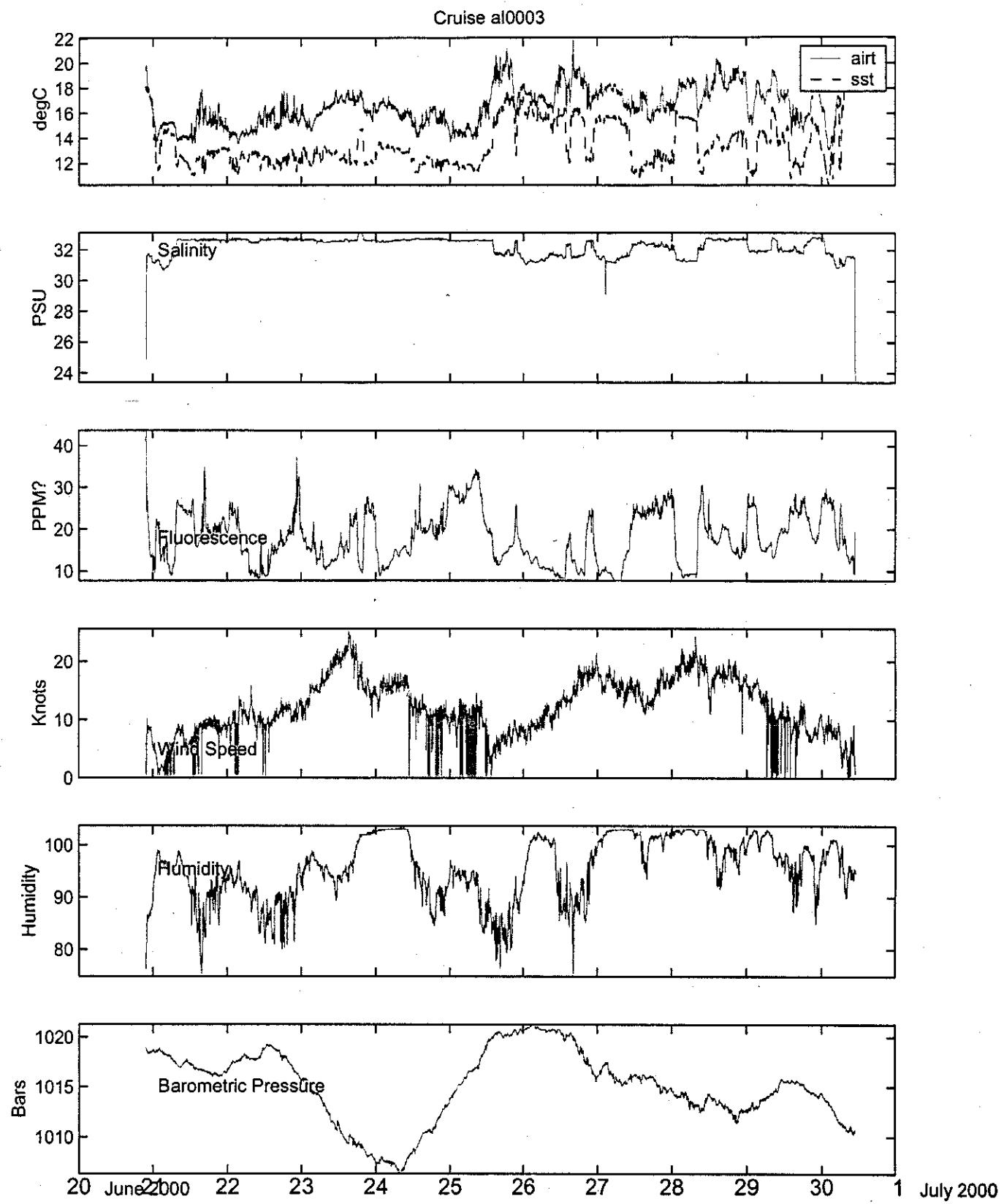


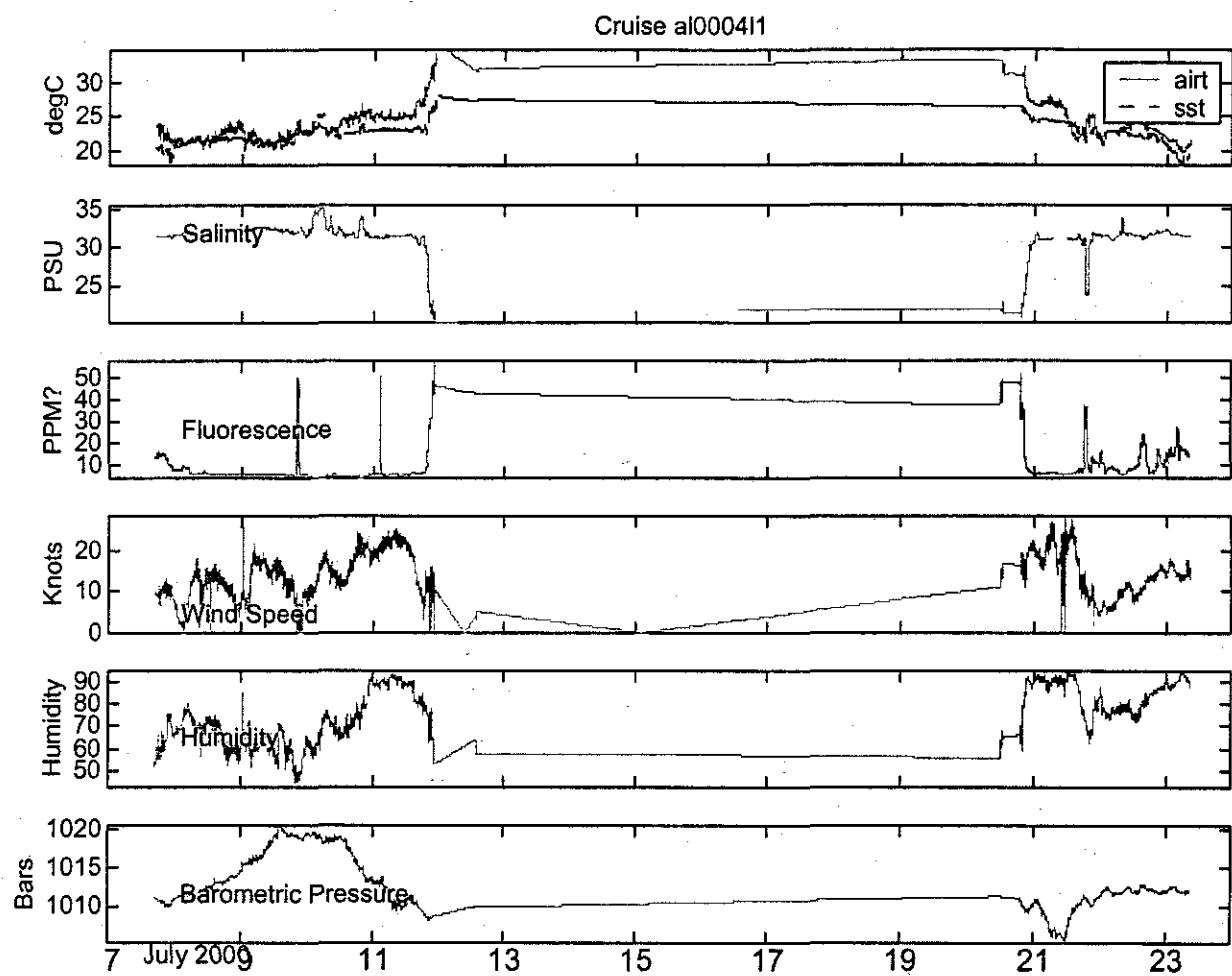


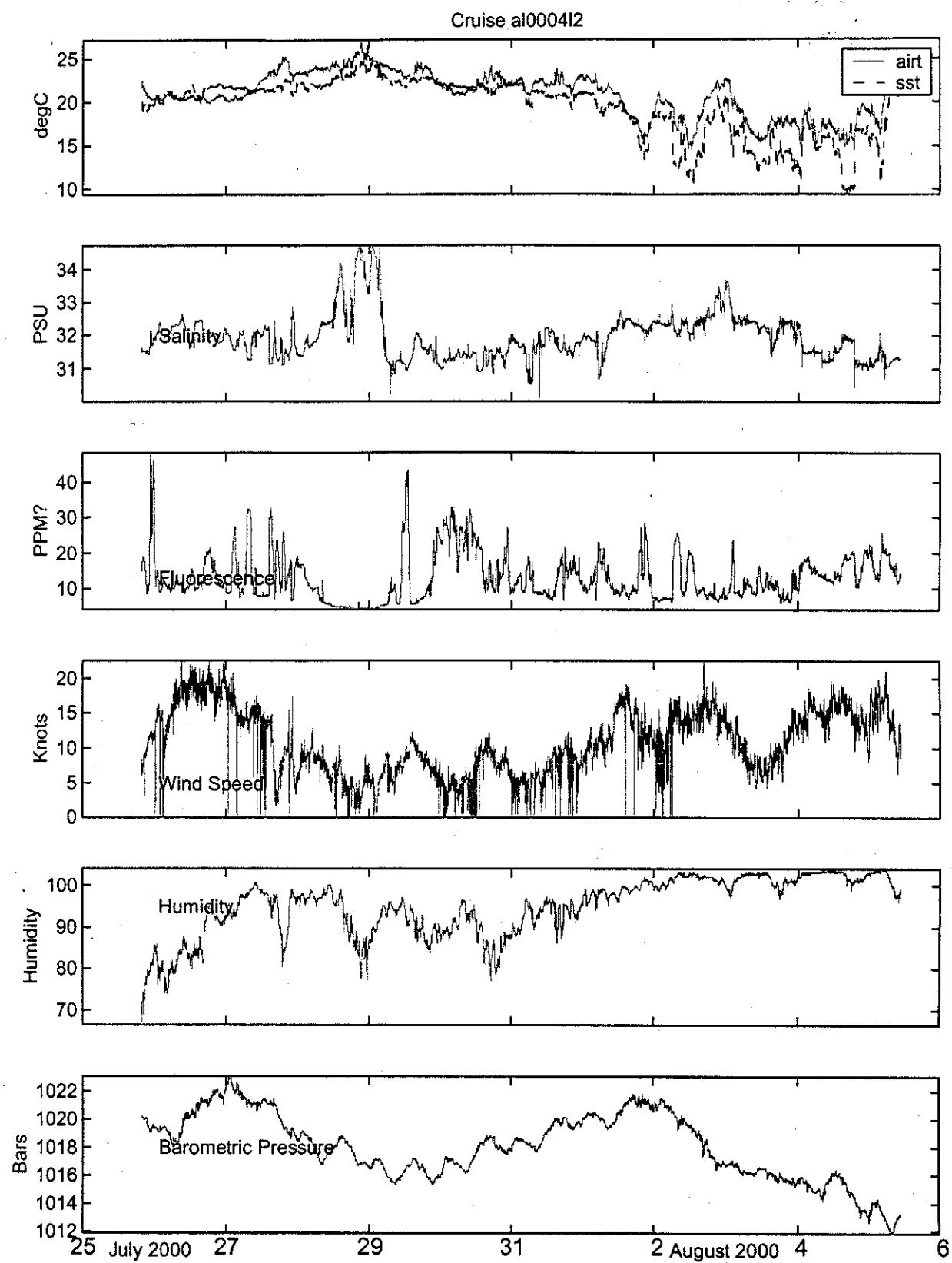


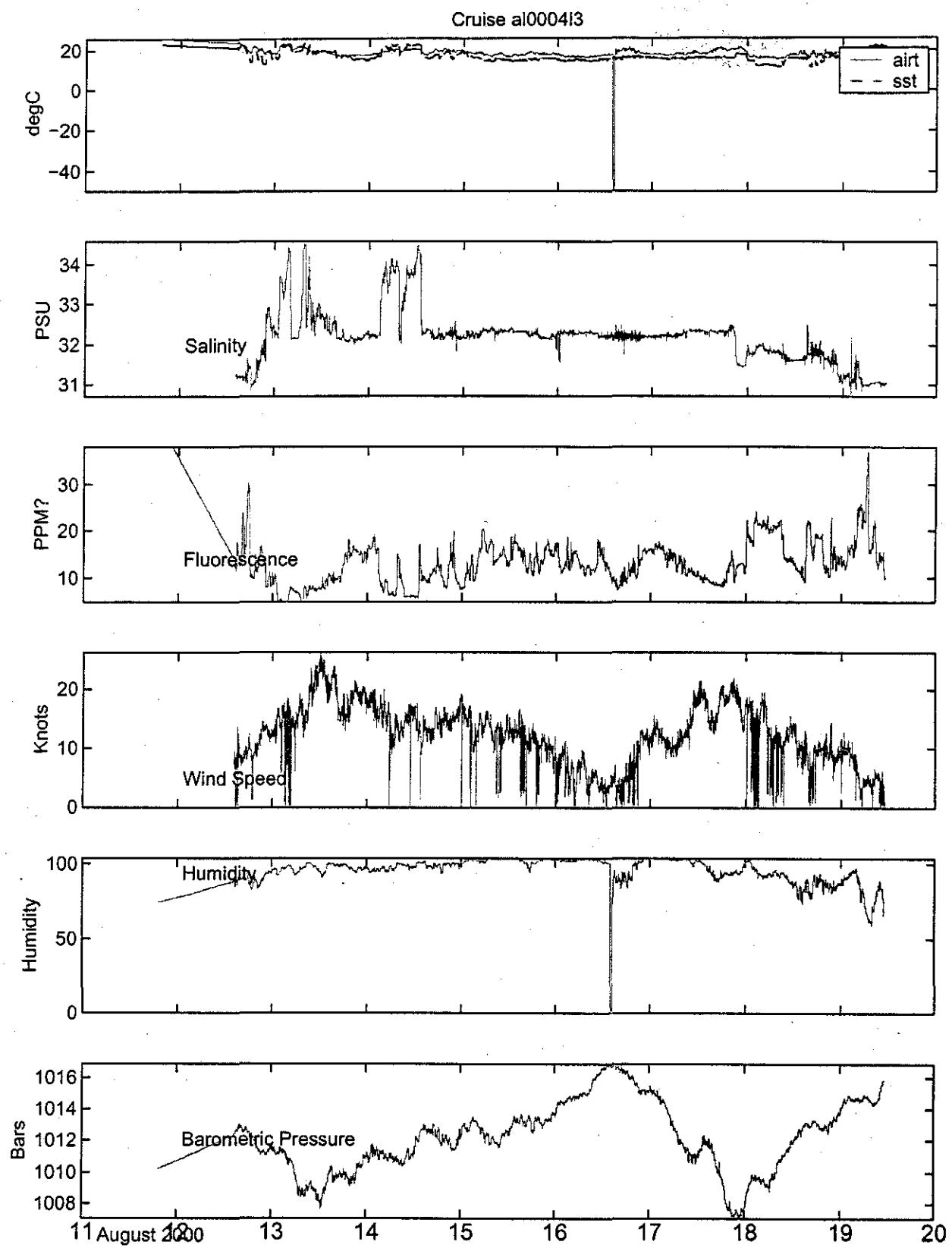


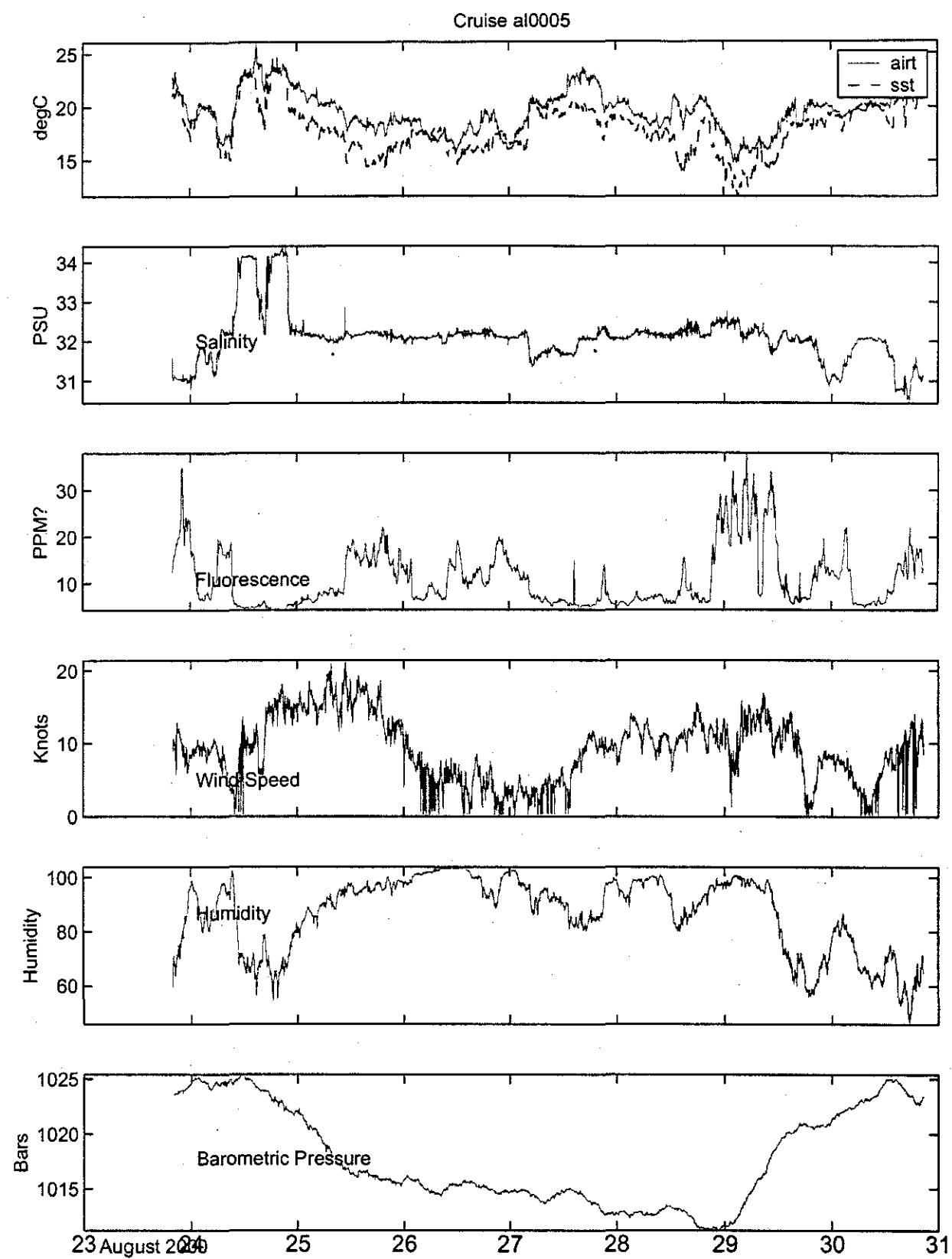


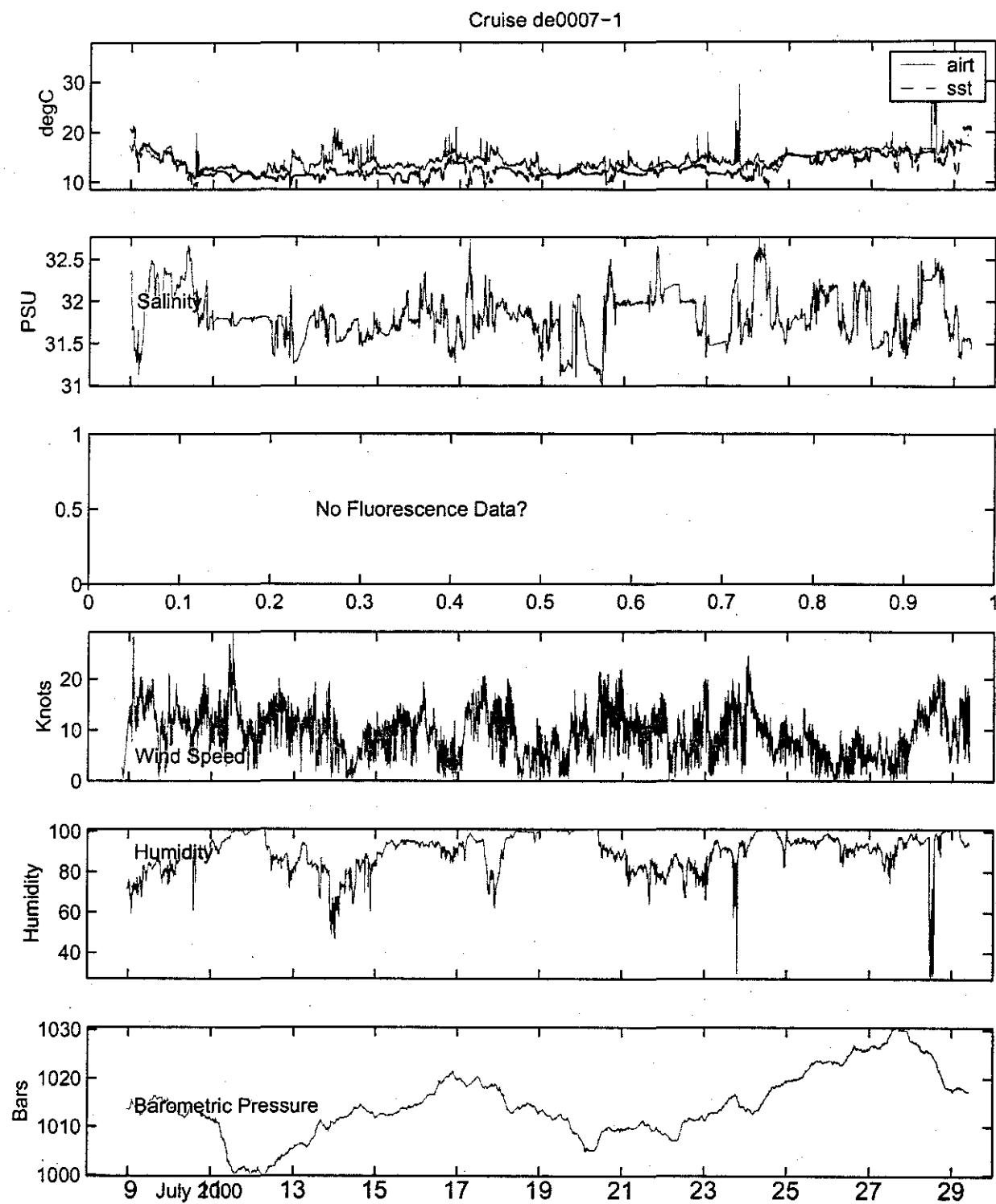


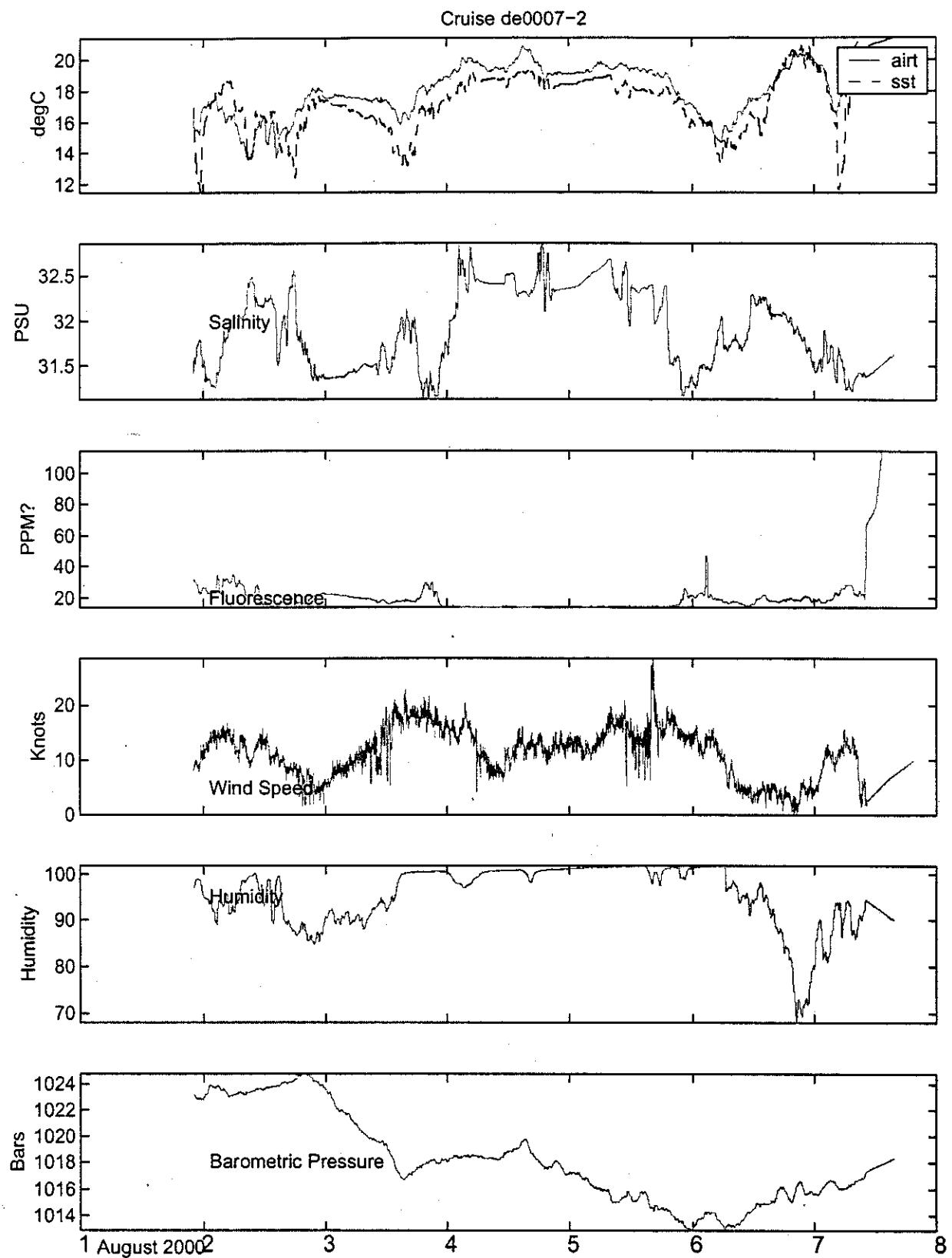


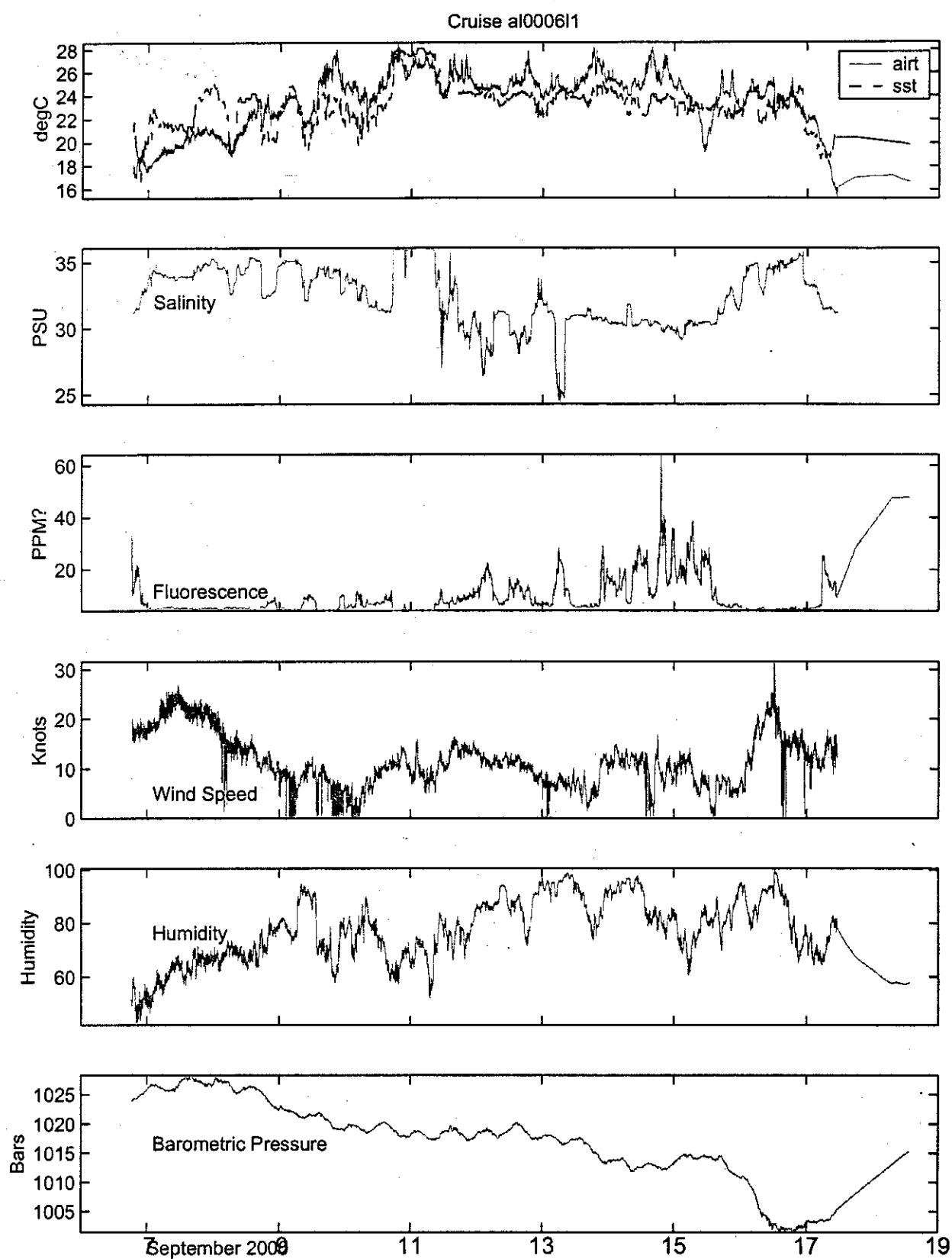


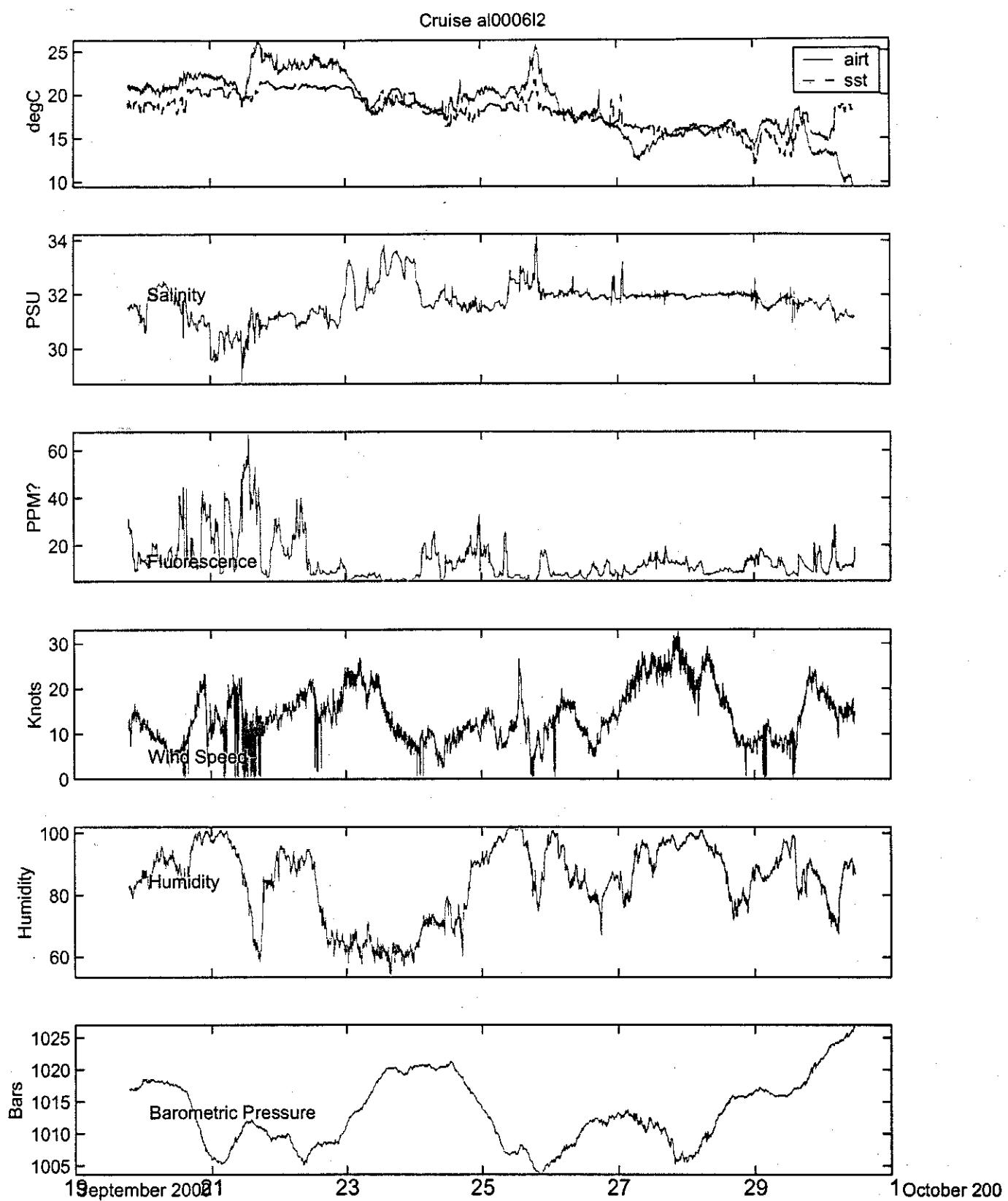


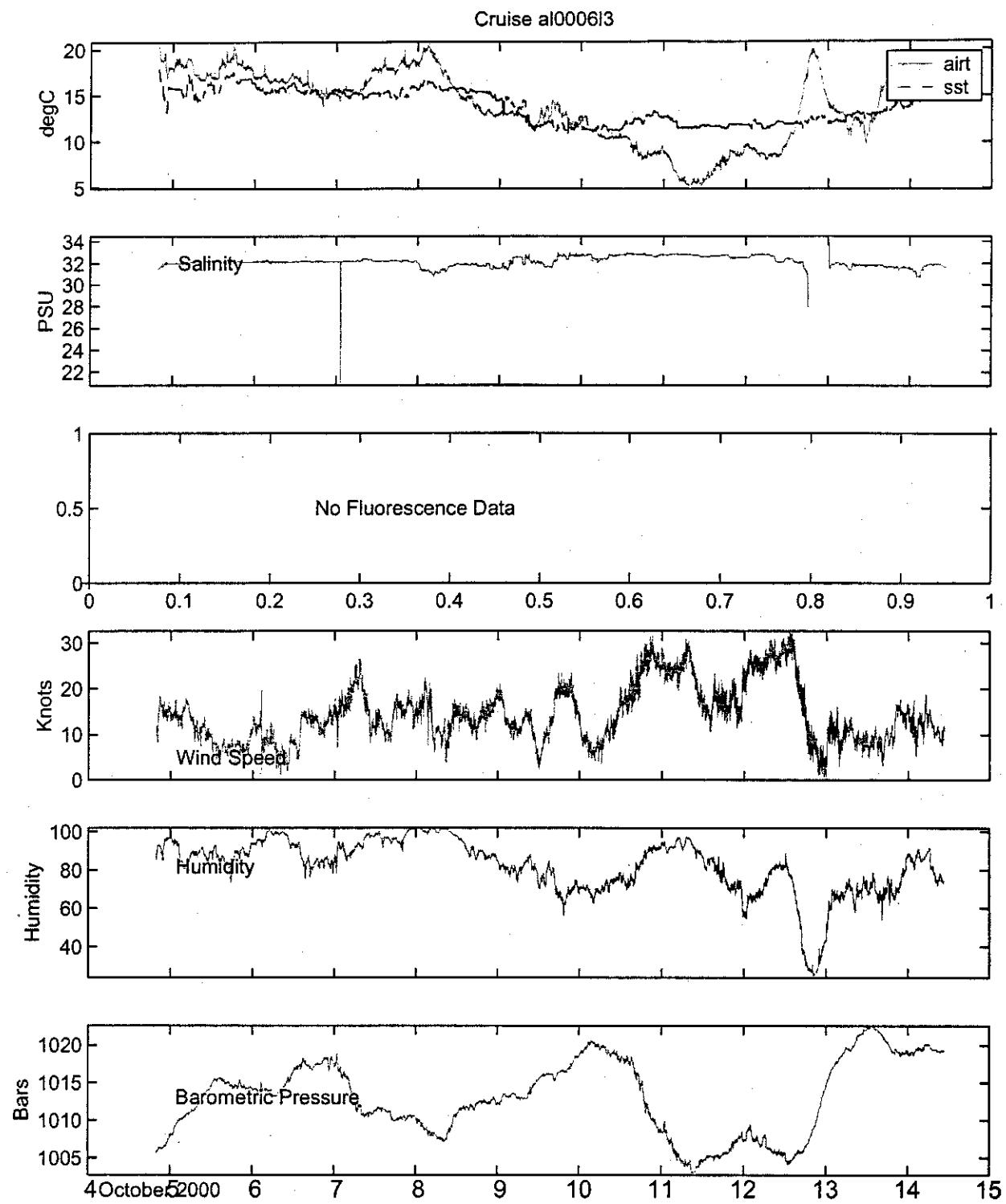


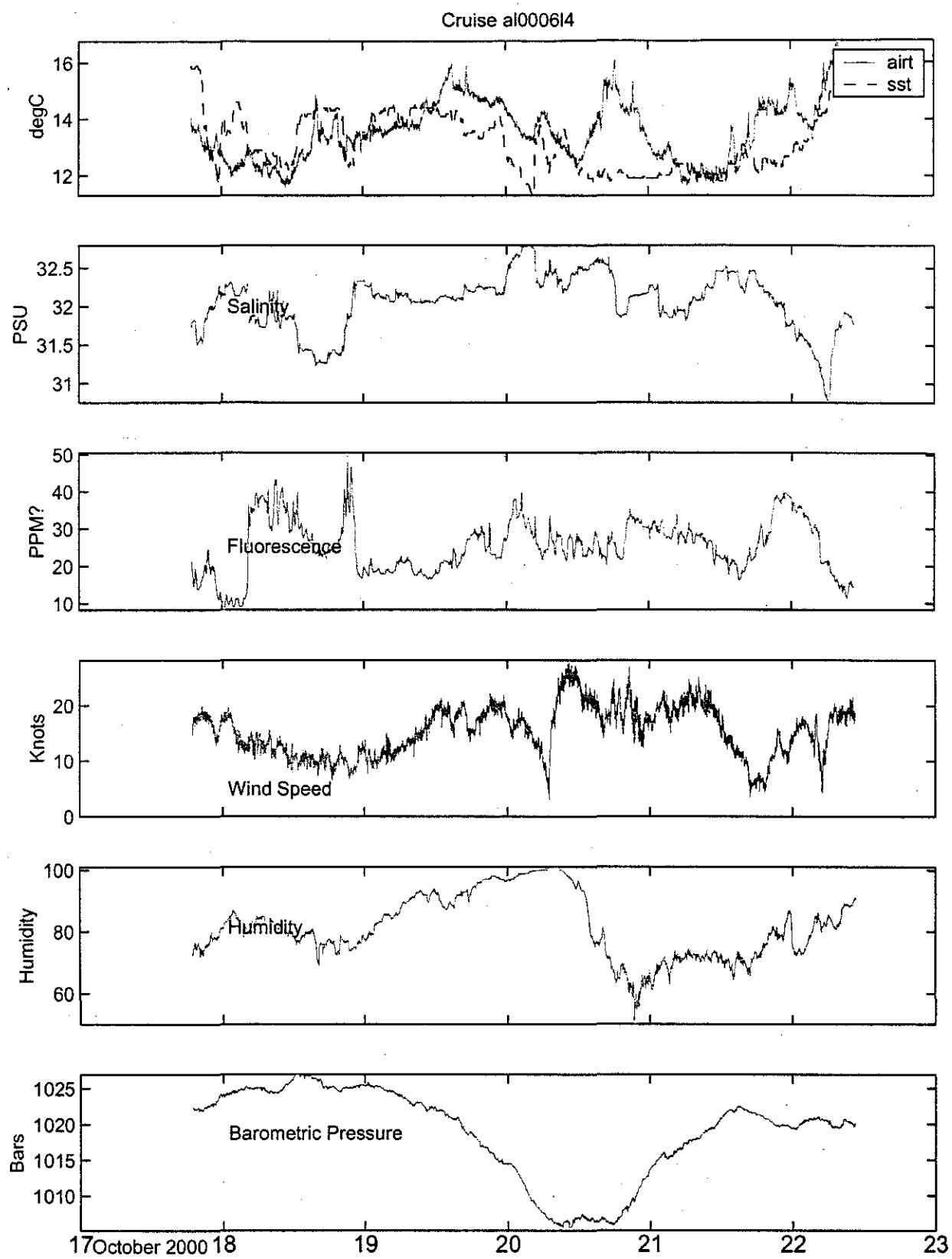


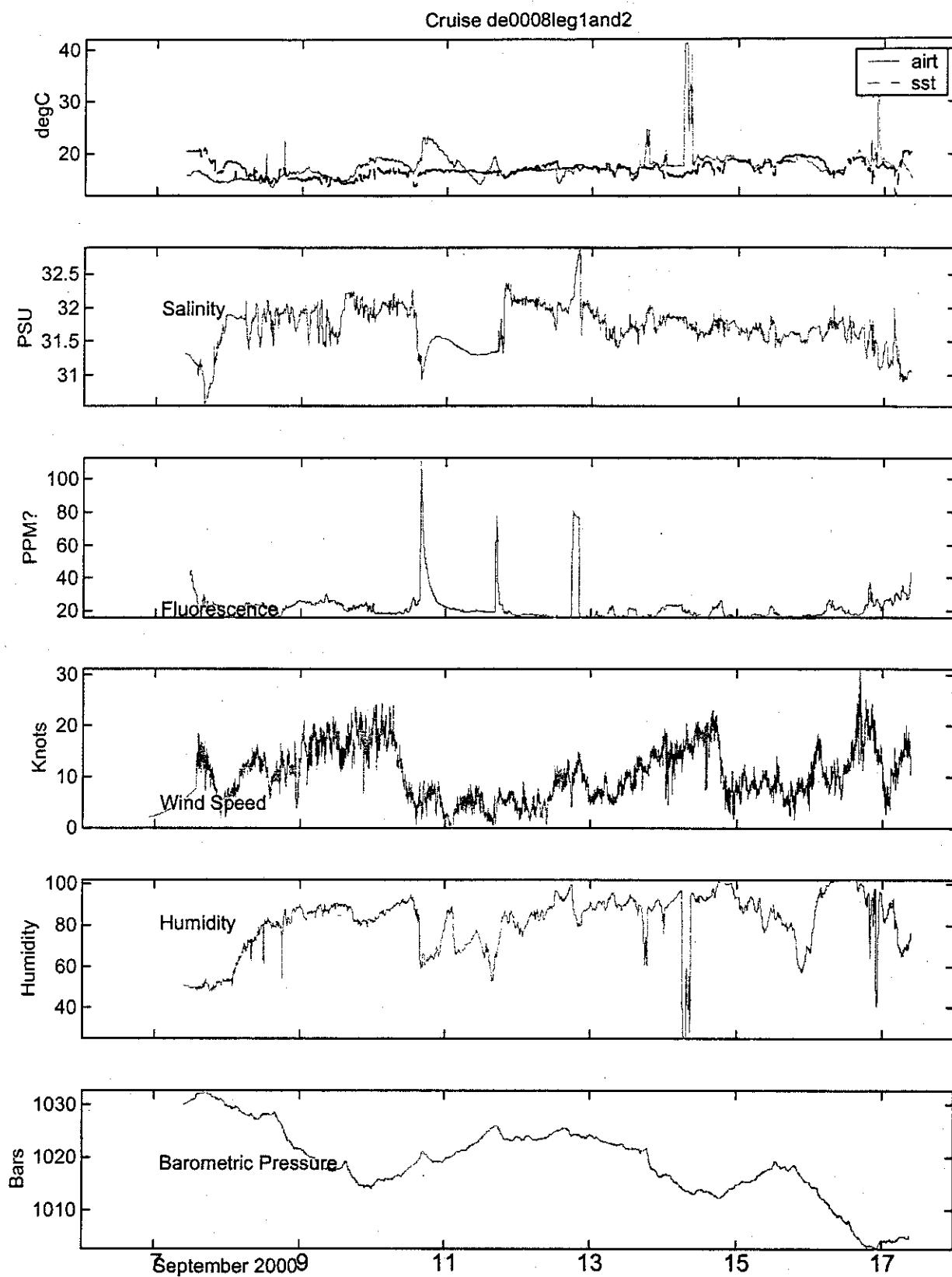


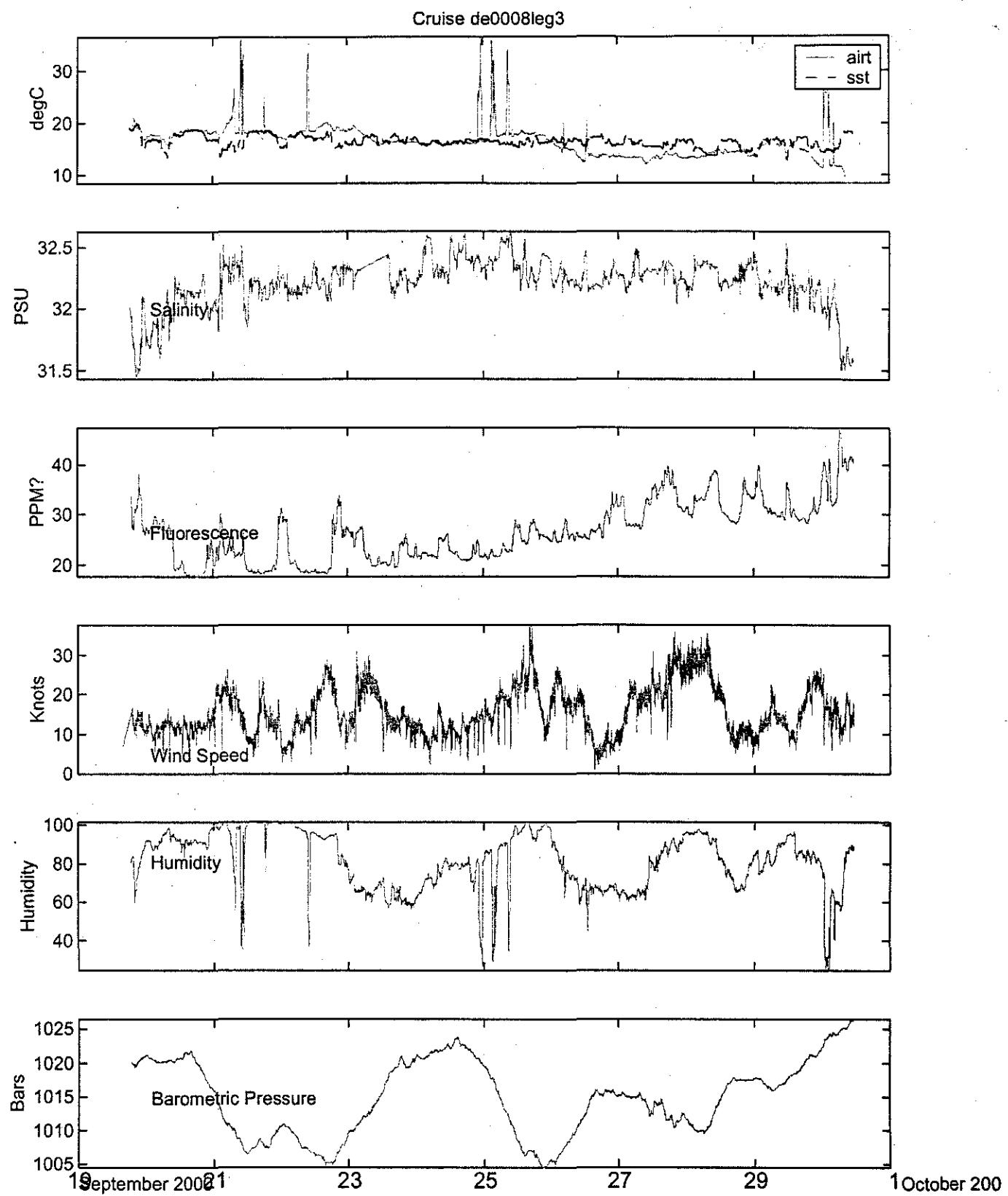


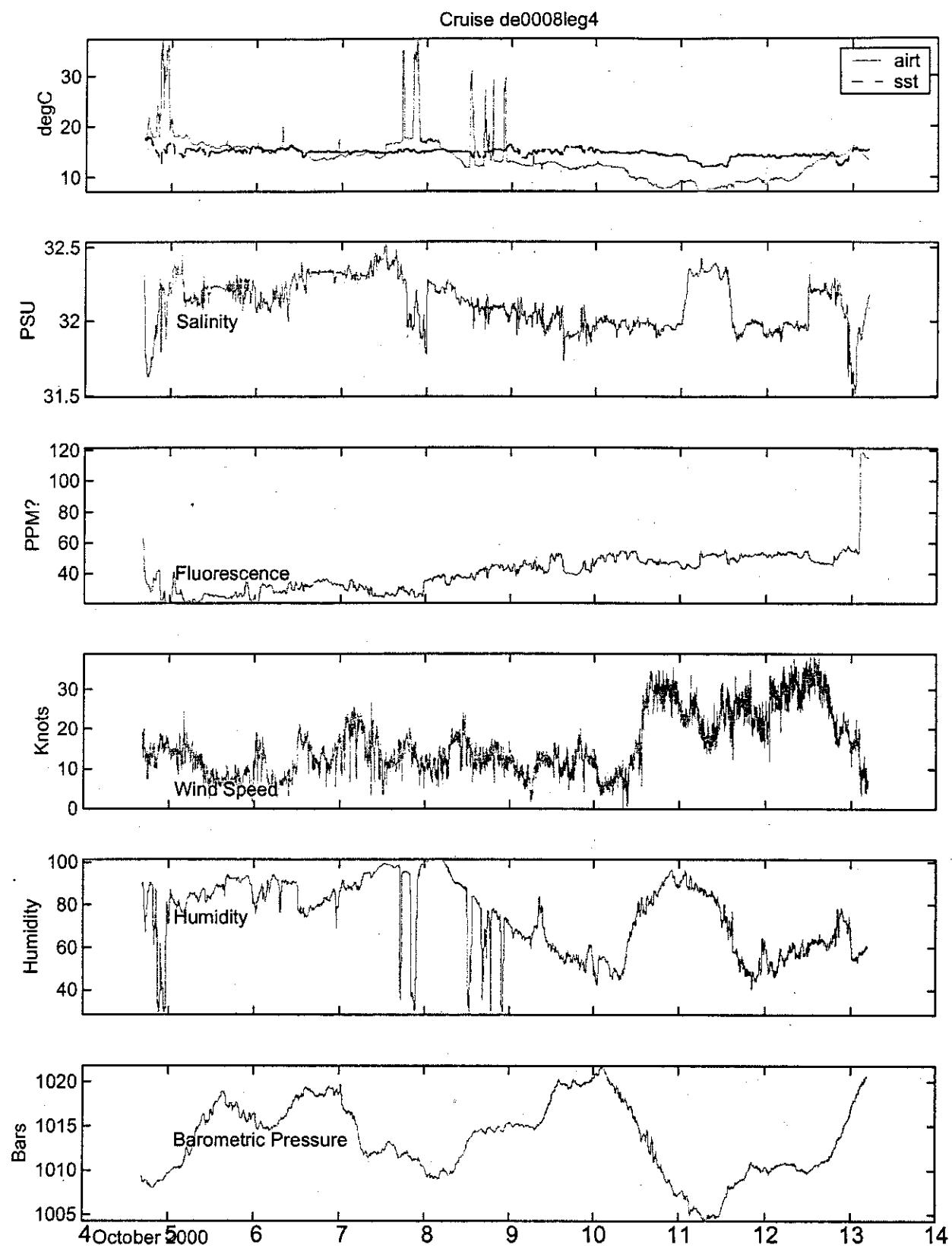


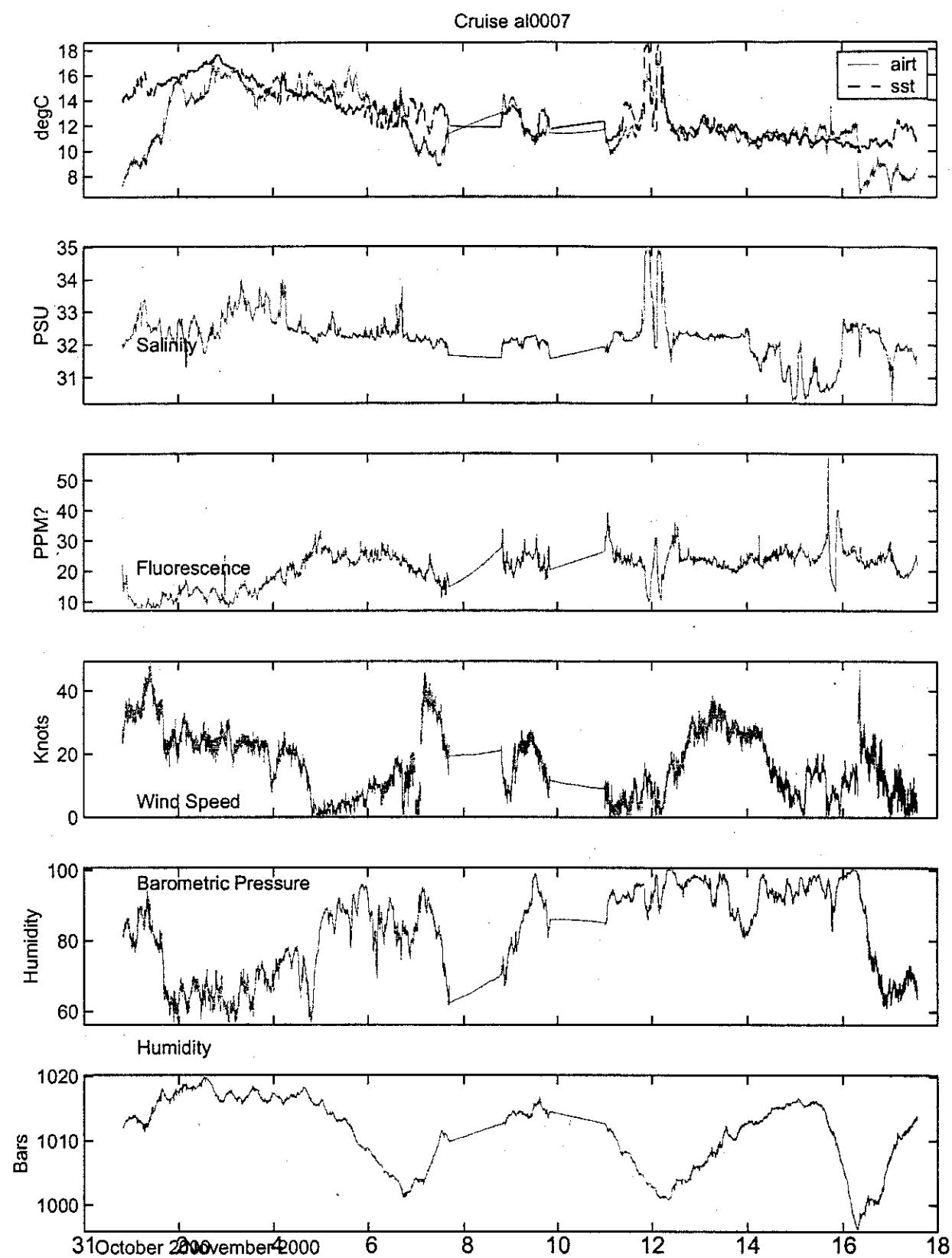


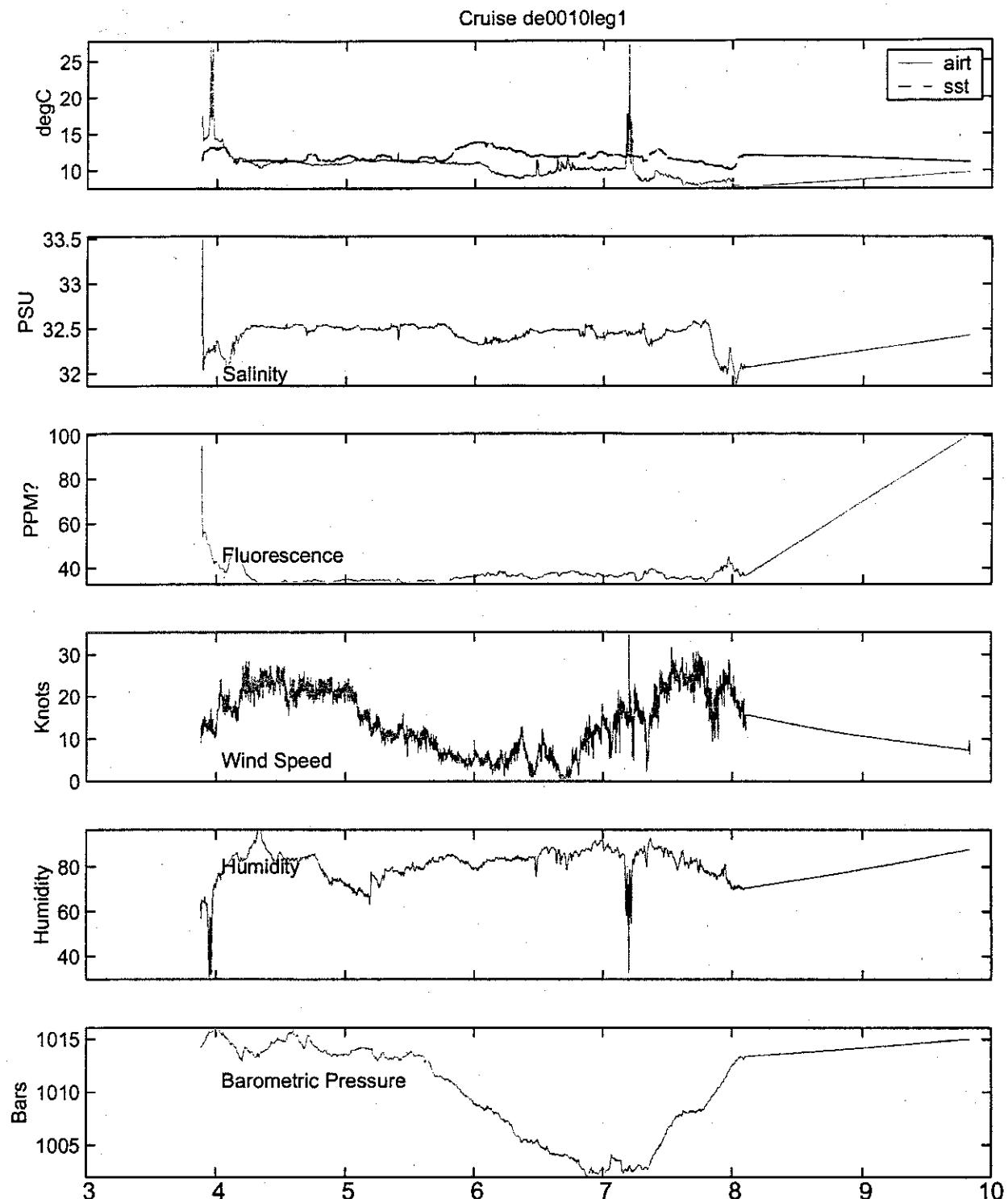




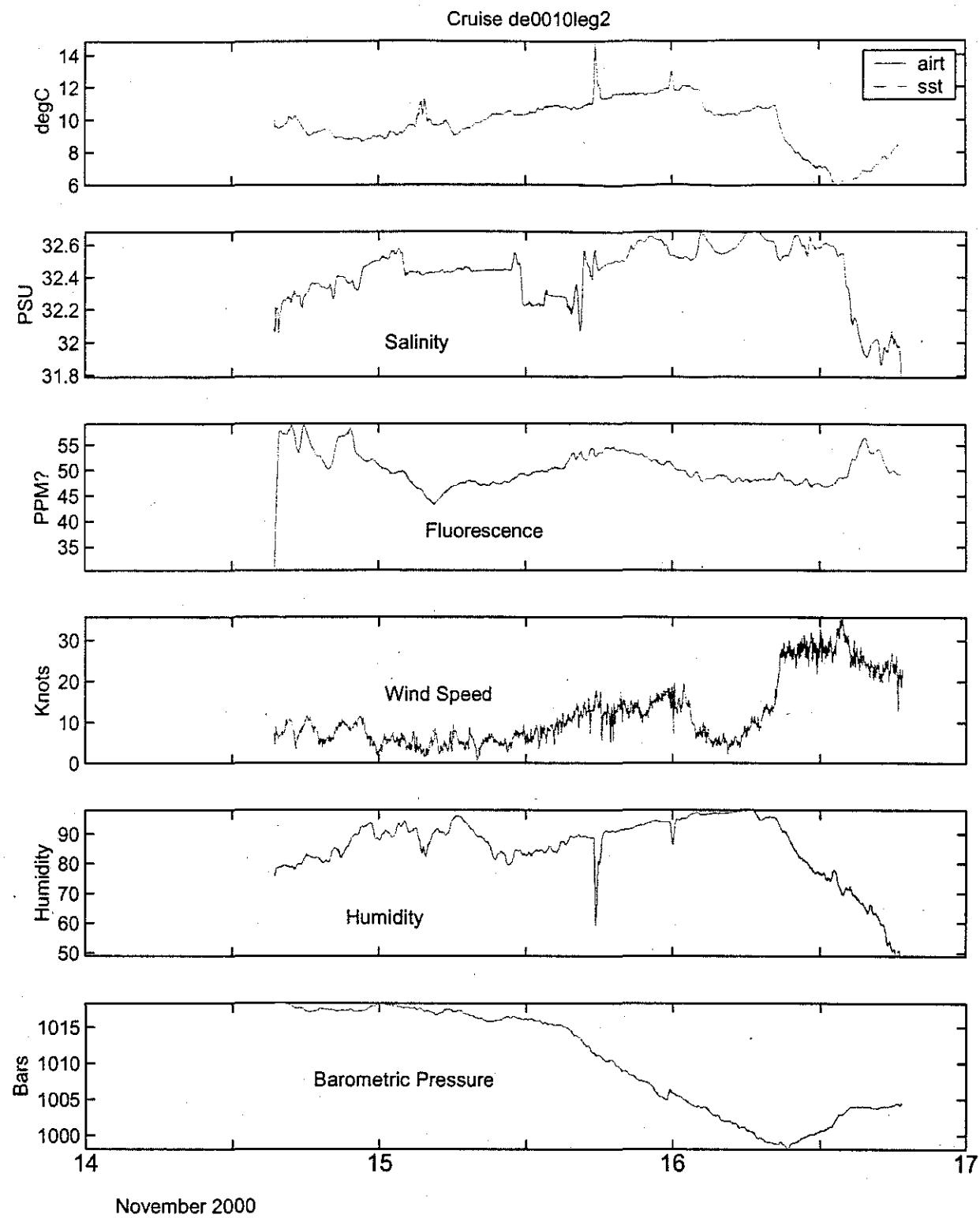








November 2000



November 2000